

**GROUNDWATER INVESTIGATION  
STACK PROPERTY  
NORTH CHICAGO, ILLINOIS**

June 1994

Prepared for:

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Geraghty & Miller, Inc. is submitting this report to the Northern Trust Company for work performed at the Stack Property site in North Chicago, Illinois. The report was prepared in conformance with Geraghty & Miller's strict quality assurance/quality control procedures so that the report meets current industry standards in terms of the methods used and the information presented. If you have any questions or comments concerning this report, please contact one of the individuals listed below.

Respectfully submitted,

GERAGHTY & MILLER, INC.

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**GROUNDWATER INVESTIGATION  
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**1.0 INTRODUCTION**

Geraghty & Miller, Inc. (Geraghty & Miller) has prepared this report to describe the investigations conducted in November 1993 on behalf of the Northern Trust Company (Northern Trust) at the Stack Property located in the 1100 block of 22nd Street in North Chicago, Lake County, Illinois. A groundwater investigation was conducted at the Stack Property to confirm and expand upon earlier studies conducted at the property.

The investigations conducted at the site are preliminary in nature and have been conducted as initial site investigation activity consistent with the National Oil and Hazardous Substances Contingency Plan (Federal Register, March 8, 1990). The site investigation work performed is in substantial compliance with the Interim Final Guidance for Performing Site Inspections Under CERCLA (September 1992). It must be noted that the work done does not constitute a completed site inspection, but rather initial steps in the site inspection process.

**1.1 SITE BACKGROUND**

Background information on the Stack Property has been summarized in the following sections from reports prepared by MAECORP, Inc., (October 9, 1988; March 27, 1989; and February 10, 1989), a Preliminary Assessment form prepared by the Illinois Environmental Protection Agency (IEPA 1990), and IEPA's unconfirmed analytical results (Fetzner, pers. comm. 1993). Information on a neighboring property (Fansteel, Inc.) has been summarized from a Preliminary Assessment report (IEPA 1991) and correspondence concerning a RCRA closure (Steger, pers. comm., 1990; Carlson, pers. comm., 1991; Carlson, pers. comm., 1993).



### **1.1.1 Site Description**

The Stack Property is located on the northeast corner of Commonwealth Avenue and 22nd Street in a primarily industrial area of North Chicago. The property is bounded to the north by the Elgin-Joliet Eastern Railroad tracks, with residentially developed districts north of the tracks (Figures 1-1 and 1-2). To the east of the site is Fansteel, Inc., a manufacturer of the munitions component, tantalum (IEPA 1991) and other non-ferrous metal products. The Stack Property is currently a vacant lot with Pettibone Creek flowing from north to south along the west-central area of the site, and a gravel road in the east-central area of the site that accesses 22nd Street (Martin Luther King Jr. Drive). Pettibone Creek discharges to Lake Michigan approximately 1 mile south and east of the site. A culvert, approximately 36 inches in diameter, enters Pettibone Creek from the west side, appearing to originate from the direction of the EMCO facility to the west.

To the east of Pettibone Creek several low piles of a dark, sand-size granular material are present. This material and dozens of ruptured 5-gallon plastic containers, as well as general trash and construction debris, are found both east and west of the creek. During the monitoring well installation and sampling activities, a strong solvent odor coming from the direction of the EMCO facility, a chemical distributor, to the west of the Stack Property was periodically noted by the Geraghty & Miller geologist.

### **1.1.2 Site History**

Two incidents occurred at the Stack Property which ultimately led to a Preliminary Assessment being conducted at the site by the IEPA in February 1990. The first incident was a fire which occurred at the site in June 1988. The fire was contained by the North Chicago fire department. Illegal waste dumping was considered the possible cause of the fire. The second incident was the discharge of a discolored liquid from the culvert into Pettibone Creek.



Relative to the second incident, MAECORP, Inc., in October 1988, at the request of the Northern Trust, collected a sample of the discolored liquid that was ponded in the stream bed of Pettibone Creek at the discharge point of the culvert. The analytical results indicated that both metals and volatile organic compounds (VOCs) were present in the discolored liquid.

Additional site characterization work, authorized by The Northern Trust in January 1989, included installation of four soil borings, three of which were completed as monitoring wells (MW-1, MW-2, and MW-3) (MAECORP, 1989a and 1989b). Soil and groundwater samples were also collected and submitted for laboratory analysis. The soil samples indicated the presence primarily of metals, but also two VOCs, methylene chloride and toluene. The groundwater samples indicated the presence of metals.

Additional soil, stream sediment and groundwater samples were collected in May of 1993 by Mostardi-Platt Associates, Inc. for the IEPA (Fetzner, pers. comm., 1993). Relative to groundwater, the IEPA data indicated the presence of several chlorinated VOCs at one monitoring well (MW-3) including vinyl chloride at a concentration greater than two milligrams per liter [(mg/L) or parts per million (ppm)]. No significant metals impacts to groundwater were indicated by the IEPA data. The soil and stream sample data indicated compounds belonging to several classes of organic chemicals were present including VOCs and semivolatile organic compounds (SVOCs), and to a lesser degree pesticides and polychlorinated biphenyls (PCBs). Concentrations of several metals such as boron, copper, lead, and zinc were elevated above background in several on-site soil and stream sediment samples.

## **1.2 PURPOSE AND SCOPE OF INVESTIGATION**

The November 1993 groundwater investigation was conducted to evaluate the quality of shallow groundwater at different locations of the site, the flow direction of shallow groundwater, and the potential for impacts to shallow groundwater from off-site sources.



Several site investigation tasks were performed to meet the project objectives. Three soil borings were installed at the Stack Property and core samples of the subsurface materials were observed and described. The borings were completed as monitoring wells, constructed to intercept the water table. These new monitoring wells (GMMW-1, GMMW-2, GMMW-3) and two previously existing wells (MW-1, MW-3) were sampled for analysis of metals and VOCs to evaluate groundwater quality conditions. Static groundwater level measurements were also made at each of the five monitoring wells sampled to determine groundwater flow direction and gradient. In addition, the locations and elevations of monitoring wells and other site features were determined by surveying so that spatial relationships were characterized.

Literature review included review of previous reports of site investigations at the Stack property and documents related to closure of Fansteel's Resource Conservation And Recovery Act (RCRA) hazardous waste management unit. The above reports and documents were supplied to Geraghty & Miller by Northern Trust. Geraghty & Miller also reviewed published geologic and hydrogeologic literature pertinent to the study area.





## **2.0 INVESTIGATION METHODS**

Work performed by Geraghty & Miller is described and documented in this section. The discussion includes rationale and details of the methods and procedures utilized.

### **2.1 MONITORING WELL INSTALLATION**

Three soil borings, GMMW-1 through GMMW-3, were drilled at the Stack Property for the purpose of recording the subsurface materials and to install monitoring wells (Figure 2-1). The locations of the monitoring wells (GMMW-1 through GMMW-3) were designed to determine groundwater flow direction and initially appraise any impacts to groundwater from offsite sources.

The well installation was conducted by Rock & Soil Drilling Corporation of St. Charles, Illinois on November 19, 1993 under the supervision of a Geraghty & Miller geologist. The borings were advanced with a truck-mounted drill rig using 4.25-inch inner diameter hollow-stem augers. Soil samples were collected for visual observation with a 2-inch diameter split spoon sampler driven by an automatic hydraulic hammer attached to the drill rig. Split spoon samples were collected on a continuous basis from the ground surface to the terminus of the borings. Logs of the soil borings are included in Appendix A.

Monitoring Wells GMMW-1, GMMW-2, GMMW-3 were installed in the three soil borings drilled at the site. The monitoring wells were constructed of 2-inch diameter, flush joint, threaded Schedule 40 polyvinyl chloride (PVC) riser and a 10-foot PVC well screen with 0.010-inch slots. The monitoring wells were installed with the screens set 7 feet (ft) into the interpreted depth of the water table. The well screen and riser were certified clean by the manufacturer, and removed directly from the plastic packaging just before installation. The annular space around the well screens was backfilled with a medium-grain quartz sand filter pack from the base of the well to approximately 1 to 3 ft above the top of the well screen. Approximately 2 ft of a bentonite pellet seal, hydrated with distilled water, was placed above the sandpack. Granular bentonite was placed above the bentonite seal to within



approximately 2 ft of the ground surface. A concrete surface seal and steel protective casing were installed at the top of the well, with a stickup of approximately 2 ft.

## **2.2 MONITORING WELL DEVELOPMENT**

The monitoring wells were developed using dedicated PVC bailers attached to nylon rope. A minimum of ten well-volumes of groundwater was removed from each of the wells. The development water was placed in 55-gallon drums and placed near Monitoring Wells GMMW-1 and GMMW-2.

## **2.3 GROUNDWATER LEVEL MEASUREMENTS**

The depth to groundwater was measured in each of the monitoring wells using an electric level indicator. The static water levels were measured on November 29, 1993, recorded in the field notebook, and are summarized in Table 2-1.

## **2.4 GROUNDWATER SAMPLING AND ANALYSIS**

Samples of groundwater were collected from Monitoring Wells MW-1, MW-2, GMMW-1, GMMW-2, and GMMW-3 on November 29, 1993. The monitoring wells were purged of a minimum of three well-volumes prior to sample collection using the dedicated bailers. For quality control purposes, a duplicate sample was collected from GMMW-3 and submitted blindly to the laboratory as "GMMW-4." Matrix spike and matrix spike duplicate samples were collected from Monitoring Well GMMW-2. In addition, a field equipment restate sample was collected by pouring distilled water through an unused bailer and collecting the restate in sample containers to verify that the sampling equipment did not contain any contaminants of concern.

The samples collected for analysis of VOCs were placed in containers preserved with hydrochloric acid. Samples collected for analysis of Target Analyte List (TAL) metals were



filtered in the field with a 0.045 $\mu$ m filtering device and placed in containers preserved with nitric acid. A list of the TAL parameters is presented in Table 2-2. The sample containers were placed in a cooler at 4°C and shipped following appropriate chain-of-custody protocols to Heritage Laboratories, Inc. in Indianapolis, Indiana via express mail. The samples submitted for analysis of VOCs were analyzed by USEPA Method 8240 (USEPA, 1986). The samples submitted for analysis of TAL metals were analyzed by USEPA Methods 6010A, 7060, 7841, 7740, and 7470, as appropriate (USEPA, 1986).

## **2.5 DECONTAMINATION**

The hollow-stem auger flights used to drill the soil borings were steam-cleaned between boring locations. Split-spoon samplers used to collect soil samples for visual observation were decontaminated before they were used by an Alconcox and water wash followed by a potable water rinse.

## **2.6 SURVEYING**

The existing monitoring wells and the wells installed by Geraghty & Miller were surveyed by Beling Consultants of Joliet, Illinois on November 29, 1993 for vertical elevation and horizontal location. In addition, site boundaries and features such as Pettibone Creek were also surveyed.

## **2.7 DATA VALIDATION**

The analytical results of samples collected during the investigation were validated by Geraghty & Miller. The analytical data were evaluated against criteria established in USEPA guidance documents (USEPA 1988a and 1988b). The goal of data validation is to verify the integrity of the data so that it can be used to assess site conditions and identify any environmental impacts. A data validation summary report is included with the laboratory report in Appendix B.



### **3.0 INVESTIGATION RESULTS AND DISCUSSION**

Investigation results including a summary of geologic and hydrogeologic literature reviewed is presented and discussed in this section. The discussion of the regional geology and hydrogeology focuses on describing strata and groundwater resources from ground surface down to and including the first regional aquitard hydraulically separating shallow and deep aquifer systems. Presentation and discussion of groundwater quality results from November 1993 conclude this section.

#### **3.1 GEOLOGY**

Geologic information is presented first on a regional basis from review of published literature. This is followed by results of site investigation work performed on the Stack Property and adjacent Fansteel property to provide the site specific geologic information.

##### **3.1.1 Regional Geology**

Regional geologic information indicates that unconsolidated deposits in the shallow subsurface in the vicinity of the site consist of glacial lake deposits and glacial till (Willman and Lineback 1970). The shallow subsurface soil at the site is part of an area mapped by Willman and Lineback (1970) as lake plain with local thin deposits of silt, clay, and sand of the Equality Formation. Lake plain areas consist of deposits from the floors of glacial lakes flattened by wave erosion and by minor deposition in low areas. These areas are largely underlain by glacial till.

The Equality Formation, common in patches throughout areas mapped as lake plain, is composed of silt, sand, gravel, and clay deposits. This formation is subdivided into two members: the Carmi Member and the Dolton Member. The Carmi Member is predominantly silt and clay while the Dolton Member is predominantly sand and gravel. In most of the lake basins, the Carmi Member deposits are only a few feet thick and rarely as much as 20 ft



thick. The Dolton Member deposits are generally less than 10 ft thick, but in some of the more prominent spits (deposits of sand or gravel projecting from a shore into a body of water) they are as thick as 25 feet (Willman 1971).

Underlying the Equality Formation at the site and at the surface to the east and west is the Wadsworth Till Member of the Wedron Formation (Willman and Lineback 1970). The Wadsworth Till Member consists predominantly of a gray clayey till containing local lenses of silt, sand, and gravel. The deposits are generally 50 to 100 ft thick, but in some of the more prominent moraines they are as thick as 300 ft.

According to Willman (1971), the bedrock immediately below the glacial deposits in the North Chicago area is the Niagaran Series Racine Dolomite. The Racine Dolomite is the uppermost Silurian formation and has a maximum thickness of about 300 ft. The Racine Formation is characterized by the presence of large reefs surrounded by argillaceous and silty dolomite with local lenses of green shale. The dolomite associated with the reefs is medium gray and vuggy. The inter-reef rock is typically light brownish gray, fine-grained, dense, and cherty dolomite. Based on well records from the Illinois State Geological Survey and the Illinois State Water Survey for water wells located in the North Chicago area, the Silurian dolomite is present at a depth of 130 to 160 ft below ground surface (bgs) with a thickness ranging from 225 to 350 ft.

Below the dolomite are the Ordovician-aged rocks of the Maquoketa Group Shale, which is the regional aquitard separating the upper Silurian dolomite aquifer from the Cambrian-Ordovician Aquifer lying below the shale. The Cambrian Ordovician Aquifer consists (in downward order) of the Ordovician-aged Galena-Platteville Dolomite and the Glenwood-St. Peter Sandstone and the Cambrian-aged Eminence-Potosi Dolomite, Franconia Formation, and Ironton-Galesville Sandstone.



### 3.1.2 Site Geology

The site geology is based on drilling logs for six monitoring wells located on the site property. For Geraghty & Miller borings, the soil sample descriptions are documented on Sample/Core Logs included in Appendix A. The site geology is illustrated in cross sections presented as Figures 3-1 and 3-2. The location of each cross section is shown on Figure 2-1. In general, the unconsolidated deposits at the site consist 1.5 to 5 ft of black sand fill underlain by 2 to 4.5 ft of tan to gray sandy silt unit (silt unit) followed by grayish silty clay unit (clay unit) to the terminus of each boring at 10.5 to 20 ft bgs. In addition, laterally discontinuous silty to gravelly sand deposits were encountered just above or within the silt unit, particularly in the northern portion of the site. The black sand fill was not present west of Pettibone Creek at Monitoring Well GMMW-3, where sandy silt was present at the surface to a depth of about 7 ft bgs.

A review of cross sections prepared by Carlson Environmental, Inc. (Carlson, pers. comm., 1993) profiling the geology at the Fansteel property, indicates that there is a silt unit with interbedded sand, gravel, and sandy clay from ground surface to a depth ranging from approximately 11 to 25 ft bgs. The cross sections lack detail and do not indicate the thickness or extent of the sand and gravel zones within the silt. With the exception of one boring (B-6), the cross sections indicate a gray silty clay unit lying below the silt unit to a depth of at least 40 ft bgs. Thin (less than 0.5 ft) sand and gravel seams are shown throughout the clay unit. Soil Boring B-6 contains a medium to coarse grained sand below the silt from a depth of about 25 to 38 ft bgs. The cross section indicates that this sand seam is not continuous throughout the property. With the possible exception of the upper silt unit, there does not appear to be laterally continuous permeable zones (sand or gravel) on the Fansteel property down to a depth of 40 ft bgs.



## 3.2 HYDROGEOLOGY

Hydrogeologic information is presented first on a regional basis from review of published literature. This is followed by results of site investigation work performed on the Stack Property and adjacent Fansteel property to provide the site specific hydrogeologic information.

### 3.2.1 Regional Hydrogeology

According to Woller and Gibb (1976), four aquifers in Lake County are used as a water source. The aquifers from shallow to deep include sand and gravel deposits in the unconsolidated materials above bedrock, the Shallow Dolomite Aquifer consisting mostly of the Silurian dolomite, the Cambrian-Ordovician Aquifer, and the Elmhurst-Mt. Simon Aquifer. The Ironton-Galesville and Glenwood-St. Peter Sandstones are the most productive units of the Cambrian-Ordovician Aquifer. The Elmhurst-Mt. Simon Aquifer consists of the Mt. Simon Sandstone and the basal sandstone of the Eau Claire Formation.

The shallow aquifers (unconsolidated deposits and Silurian dolomite) are connected hydraulically and are recharged directly by seepage from precipitation (Willman 1971). The Maquoketa Group, composed primarily of non-water bearing shales, provides a hydrologic barrier between the shallow dolomite aquifer and the Cambrian-Ordovician aquifer. The Cambrian-Ordovician Aquifer is separated from the Elmhurst-Mt. Simon Aquifer by the shaly and silty beds of the Eau Claire Formation, which prevent flow between the aquifers.

### 3.2.2 Site Hydrogeology

The site hydrogeologic study focused on the uppermost portion of the unconsolidated deposits. On November 29, 1993, groundwater levels were measured in each of the monitoring wells onsite. The water level data is presented in Table 2-1. The depth to water in the on-site wells ranged from 7.22 ft to 13.81 ft below ground surface. Based on the



water elevations, a groundwater elevation contour map (Figure 3-3) was prepared. Groundwater flow directions ranged from southwest to southeast and were towards Pettibone Creek. Thus, it appears that Pettibone Creek may be a local discharge area for shallow groundwater. The horizontal hydraulic gradient was in the range from 0.01 to 0.02 feet per foot (ft/ft).

Pettibone Creek flows from north to south across the site property. South of the site Pettibone Creek flows south and east through the Great Lakes Naval Training Center where it enters Lake Michigan approximately 1.2 miles from the site.

The elevation of the base of the Pettibone Creek was measured near the south and north ends of the site. The elevation at the south end was 637.58 ft above mean sea level (msl) while the elevation at the north end was 640.40 ft above msl. On November 29, 1993, groundwater elevations ranged from 635.65 ft above msl to 641.91 ft above msl. Based on a comparison of the water table elevations and the elevations at the base of the creek, it appears that shallow groundwater would discharge to Pettibone Creek. The water depth observed in the creek was only a few inches on November 29, 1993, which is consistent with the water table elevations relative to the creek base. The elevation of the water table relative to the base of the creek is illustrated in Cross Section A-A' (Figure 3-1).

### **3.3 GROUNDWATER QUALITY**

The validated analytical results of samples collected for the groundwater investigation are presented in Tables 3-1 and 3-2. Data qualifiers from the data validation process have been included in the data summary tables to document the quality of the data. The data qualifiers were minimal and do not have any significant impact on interpretations or conclusions of this report.

Comparison of the quality control "GMMW-4" sample to its duplicate sample from Monitoring Well GMMW-3 indicated an excellent agreement in the compounds detected and





the concentrations at which they were found (Tables 3-1 and 3-2). The rinse blank sample showed a low concentration of the metal boron (0.084 mg/L), the likely source of which is the distilled water used for the blank.

### 3.3.1 Volatile Organic Compounds

VOCs were detected in Monitoring Wells MW-3, GMMW-2, and GMMW-3. The detected VOCs consisted exclusively of chlorinated compounds, including 1,1-dichloroethene (1,1-DCE), 1,2-DCE, trichloroethene (TCE), and vinyl chloride (VC). The sample from Monitoring Well MW-3 was found to contain the highest concentrations of VOCs.

Concentrations of the detected compounds were compared to water quality standards for Illinois Class I Potable Resource Groundwater (Table 3-1) [Illinois Administrative Code Title 35 Section 620.410 (35 IAC 620.410)]. It is noted that no determination has been made as to the classification of the shallow aquifer at the site; and therefore, Class I water quality standards may not apply. Water quality standards for Class II General Resource Groundwater are less stringent than the Class I water quality standards and may apply to this site. In Monitoring Well MW-3, the compounds 1,1-DCE, TCE, and VC were found to exceed the Class I water quality standards. Although standards have not been specified for total 1,2-DCE to date, the detected concentrations exceed standards specified for the isomers cis-1,2-DCE and trans-1,2-DCE (70 µg/l and 100 µg/L, respectively). The concentrations of 1,1-DCE, total 1,2-DCE, TCE, and VC in well MW-3 also exceed their respective Class II water quality standards.

The VOCs detected and the concentrations determined from the November 1993 sampling event are consistent with the IEPA sampling results discussed in Section 1.1.2. No VOCs were present in groundwater samples collected and analyzed in 1989 by MAECORP (1989) as previously discussed in Section 1.1.2.



The location of sources, and the delineation of lateral and vertical extent of VOC impacts were beyond the scope of the investigation conducted. The areal distribution and vertical extent of VOC impacts is a function of source location, time since release(s) occurred, groundwater flow direction and gradient, and site geology as it relates to preferential pathways for migration.

### 3.3.2 Metals

Data from the five samples collected and analyzed in November 1993 indicate there are no significant groundwater impacts with respect to metals. The groundwater sample and duplicate sample collected from Monitoring Well GMMW-3 were found to contain levels of manganese and arsenic that slightly exceed Class I water quality standards (Table 3-2). Analysis of the sample collected from Monitoring Well GMMW-2 also indicated manganese to exceed Class I water quality standards. However, arsenic and manganese are naturally-occurring constituents in groundwater and the concentrations measured may be a natural phenomenon.

Concentrations of metals detected in groundwater samples collected in November 1993 were consistent with IEPA 1993 groundwater data discussed in Section 1.1.2. However, metals data reported by MAECORP (1989) did identify groundwater impacts for barium, cadmium, chromium, lead, mercury, selenium and silver. The differences in metals results may be related to whether groundwater samples were field filtered before preserving with acid or not. Field filtered samples typically have lower metals concentrations. Geraghty & Miller standard protocol is to field filter groundwater samples from monitoring wells.



## **4.0 SUMMARY AND CONCLUSIONS**

On behalf of The Northern Trust Company, Geraghty & Miller, Inc., conducted a groundwater quality investigation at the Stack Property in North Chicago, Illinois. The investigation was conducted to evaluate shallow groundwater quality, groundwater flow direction and the potential for offsite sources to impact groundwater quality on site. A summary of findings is presented in this section followed by associated conclusions.

### **4.1 SUMMARY OF FINDINGS**

The objectives of the study were met by installation of three additional monitoring wells to further characterize site geology and hydrogeology. Collection and analysis of groundwater samples from two existing and three new monitoring wells provided data relative to groundwater quality. A summary of findings relative to site geology and hydrogeology, as well as groundwater quality is presented below.

#### **4.1.1 Geology**

Materials in the shallow subsurface at the site have been investigated by installation of four previous and three new (November 1993) soil borings to depths of up to approximately 20 ft. Black, sandy fill material was present from ground surface to a depth of several feet across much of the site. Unconsolidated sediments of glacial origin underlay the fill and in descending order included a silt unit and a clay unit which were continuous across the site. The clay unit contains lenses of silt and sand which have limited lateral continuity. Laterally discontinuous sand and silt intervals, with a combined thickness of several feet, were present directly above the clay unit in the northern portion of the site. The geology of the shallow subsurface at the site was consistent with published reports for the area.



#### **4.1.2 Hydrogeology**

Site specific information has been developed from previously installed soil borings (four) and monitoring wells (three), and three new (November 1993) monitoring wells. Groundwater was found to occur under water table conditions at depths of approximately 7 to 14 ft below ground surface within a silt unit or clay unit, depending on location at the site. Groundwater flow was generally southerly, with southwest and southeast components towards Pettibone Creek on the day measured. Pettibone Creek was at a low flow stage on the day that static groundwater level elevations were measured. Shallow groundwater from both Fansteel and EMCO would enter the Stack property according to the groundwater flow direction determined from measurements made on November 29, 1993. Horizontal gradients at the water table ranged from 0.01 to 0.02 ft/ft.

The character of subsurface sediments on the Fansteel property, to depths of 11 to 25 ft below ground surface, could not be determined due to lack of detail in cross sections reviewed. A clay unit was present below depths of 11 to 25 ft, and continued down to at least 40 ft, according to information reviewed for the Fansteel property.

#### **4.1.3 Groundwater Quality**

Chlorinated VOCs were detected in three of five on-site monitoring wells sampled in November 1993. The highest VOC concentrations were found in Well MW-3 which contained 1,1-DCE, 1,2-DCE, TCE, and VC in concentrations above Illinois Class I Potable Resource Groundwater Standards and Class II General Resource Groundwater Standards. Well GMMW-3 also contained VC at a concentration above both the Class I and Class II water quality standards. The November 1993 sampling results were consistent with groundwater samples collected and analyzed by IEPA in 1993.

Identification of VOC sources, and delineation of the lateral and vertical extent of VOC impacts were beyond the scope of the investigation conducted. The areal distribution



and vertical extent of VOC impacts is a function of source location, the time since the release(s) occurred, groundwater flow direction and gradient, and site geology as it relates to preferential pathways for migration.

No significant groundwater impacts with respect to metals were evident based on the November 1993 sampling data. Concentrations of arsenic in one instance, and manganese, in two instances, which exceed standards for Illinois Class I groundwater could be due to natural causes. The November 1993 data are consistent with the IEPA 1993 data, but not with the 1989 MAECORP data. Sampling procedures related to field filtering groundwater samples may be a major factor in explaining the differences.

## **4.2 CONCLUSIONS**

Conclusions of the investigation relative to site geology and hydrogeology, as well as groundwater quality are presented below.

### **4.2.1 Geology**

Conclusions regarding the nature of materials present in the shallow subsurface are as follows:

- Black, sandy fill, typically several feet in thickness, is present across most of the site, except possibly west of Pettibone Creek.
- Fill materials are underlain by materials of glacial origin with deposits of permeable materials (sand and silt) more prevalent in the northern portion of the site.
- The continuity of sand and silt deposits from the Stack Property east to the Fansteel RCRA unit could not be determined from the documents reviewed.



#### **4.2.2 Hydrogeology**

Conclusions regarding the nature and occurrence of shallow groundwater at the site are as follows:

- Groundwater occurs under water table conditions at shallow depths (less than 15 ft) below ground surface.
- Shallow groundwater probably discharges to Pettibone Creek during some periods of the year.
- Groundwater flow was onto the Stack property from neighboring properties to the east (Fansteel) and the west (EMCO) on the day measurements were made.
- The areal and vertical distribution of saturated, permeable glacial sediments will strongly influence the migration of contaminants in shallow groundwater at the site. The northern portion of the site is more susceptible to the spread of contaminants due to the more extensive sand and silt deposits.

#### **4.2.3 Groundwater Quality**

Conclusions regarding groundwater quality conditions are as follows:

- Shallow groundwater at the site is impacted by chlorinated VOCs with one or more VOCs present at concentrations above both Illinois Class I Potable Resource Groundwater Standards and Class II General Resource Groundwater Standards at two monitoring wells (MW-3 and GMMW-3).
- The data collected do not indicate shallow groundwater has been impacted by metals.



## **5.0 REFERENCES**

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## TABLES

)

)



Table 2-1. Groundwater Elevation Data, November 29, 1993,  
Stack Property, North Chicago, Illinois.

Well	Measuring Point Elevation (ft) <sup>1</sup>	Depth to Water (ft)	Groundwater Elevation (ft) <sup>1</sup>
MW-1	651.83	9.92	641.91
MW-2	651.03	NM <sup>2</sup>	NM
MW-3	650.43	10.34	640.09
GMMW-1	651.61	15.96	635.65
GMMW-2	650.99	10.60	640.39
GMMW-3	649.72	11.49	638.23

1. Feet above mean sea level.

2. Not measured.

CI0325.002\Table2-1.WK1



Table 2-2 TARGET ANALYTE LIST

Metals (TCL/HSL/Superfund)

EPA Methods Various

Matrix: Water/Soil/Semisolid

- 
- ☐ 1. Aluminum
  - ☐ 2. Antimony
  - ☐ 3. Arsenic
  - ☐ 4. Barium
  - ☐ 5. Beryllium
  - ☐ 6. Cadmium
  - ☐ 7. Calcium
  - ☐ 8. Chromium
  - ☐ 9. Cobalt
  - ☐ 10. Copper
  - ☐ 11. Iron
  - ☐ 12. Lead
  - ☐ 13. Manganese
  - ☐ 14. Mercury
  - ☐ 15. Nickel
  - ☐ 16. Potassium
  - ☐ 17. Selenium
  - ☐ 18. Silver
  - ☐ 19. Sodium
  - ☐ 20. Thallium
  - ☐ 21. Vanadium
  - ☐ 22. Zinc
  - ☐ 23. Boron
- 

## Instructions for Use:

1. If all compounds required leave boxes blank.
2. If only certain compounds are required place an X in box next to compound.
3. If certain compounds should be deleted from report cross out entire compound with heavy black felt tip pen.



Table 2-2 TARGET ANALYTE LIST (continued)

## Volatile Organic Compounds

EPA Methods 624-CLP-M/624/8240/8260

Matrix: Water/Soil/Semisolid

- 
- ☐ 1. 1,1,1-Trichloroethane
  - ☐ 2. 1,1,2,2-Tetrachloroethane
  - ☐ 3. 1,1,2-Trichloroethane
  - ☐ 4. 1,1-Dichloroethane
  - ☐ 5. 1,1-Dichloroethane
  - ☐ 6. 1,2-Dichloroethane
  - ☐ 7. 1,2-Dichloroethane (total)
  - ☐ 8. 1,2-Dichloropropane
  - ☐ 9. 2-Butanone
  - ☐ 10. 2-Hexanone
  - ☐ 11. 4-Methyl-2-pentanone
  - ☐ 12. Acetone
  - ☐ 13. Benzene
  - ☐ 14. Bromodichloromethane
  - ☐ 15. Bromoform
  - ☐ 16. Bromomethane
  - ☐ 17. Carbon Disulfide
  - ☐ 18. Carbon Tetrachloride
  - ☐ 19. Chlorobenzene
  - ☐ 20. Chloroethane
  - ☐ 21. Chloroform
  - ☐ 22. Chloromethane
  - ☐ 23. cis-1,3-Dichloropropene
  - ☐ 24. Dibromochloromethane
  - ☐ 25. Ethyl Benzene
  - ☐ 26. Methylene chloride
  - ☐ 27. Styrene
  - ☐ 28. Tetrachloroethene
  - ☐ 29. Toluene
  - ☐ 30. trans-1,3-Dichloropropene
  - ☐ 31. Trichloroethene
  - ☐ 32. Vinyl Acetate
  - ☐ 33. Vinyl Chloride
  - ☐ 34. Xylenes (total)
- 

## Instructions for Use:

- 1. If all compounds required leave boxes blank.
- 2. If only certain compounds are required place an X in box next to compound.
- 3. If certain compounds should be deleted from report cross out entire compound with heavy black felt tip pen.



Table 3-2 Summary of Analytical Results for Metals  
Stack Property, North Chicago, Illinois

Sample Number:	MW-1	MW-3	GMMW-1	GMMW-2	GMMW-3	Rinse Blank	*GMMW-4	Class I Standard	Class II Standard
Compound	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Aluminum	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NS	NS
Antimony	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	NS	NS
Arsenic	<0.005	<0.005	<0.005	<0.005	0.1	<0.005	0.092	0.05	0.2
Barium	0.089	0.069	0.032	0.12	0.15	<0.01	0.15	2	2
Beryllium	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	NS	NS
Boron	0.089	0.069	0.032	0.12	0.15	0.084	1.6	2	2
Cadmium	0.0019	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.005	0.05
Calcium	J 120	J 100	J 150	J 130	J 160	J<0.2	J 160	NS	NS
Chromium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.1	1
Cobalt	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1	1
Copper	0.028	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.65	0.65
Iron	J<0.025	J<0.025	J 0.49	J 1.3	J 3.5	J<0.025	J 2.8	5	5
Lead	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.0075	0.1
Magnesium	32	45	76	50	81	<0.2	84	NS	NS
Manganese	J 0.048	J 0.019	J 0.065	J 0.25	J 0.43	J<0.01	J 0.44	0.15	10
Mercury	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.002	0.01
Nickel	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.1	2
Potassium	21	4.7	3.3	18	3.2	<0.2	3.2	NS	NS
Selenium	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.05	0.05
Silver	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.05	NS
Sodium	42	73	19	71	62	<0.2	63	NS	NS
Thallium	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	NS	NS
Vanadium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	NS	NS
Zinc	0.26	<0.02	0.021	0.046	<0.02	<0.02	<0.02	5	10

\* Sample GMMW-4 is a duplicate of the sample collected from Monitoring Well GMMW-3.

Light shade indicates that the analyte concentration exceeds Illinois Class I Groundwater Quality Standards.

NS indicates that a cleanup objective has not been specified for the constituent.

J Concentration or detection limit is estimated based on validation of data.

**Table 3-1 Summary of Analytical Results for Volatile Organic Compounds**  
Stack Property, North Chicago, Illinois.

Sample Number:	MW-1	MW-3	GMMW-1	GMMW-2	GMMW-3	Rinse Blank	*GMMW-4	Class I Standard	Class II Standard
Compound	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Acetone	<20	<20	<20	<20	<20	<20	<20	NS	NS
Benzene	<5	<5	<5	<5	<5	<5	<5	5	25
Bromodichloromethane	<5	<5	<5	<5	<5	<5	<5	NS	NS
Bromoform	<5	<5	<5	<5	<5	<5	<5	NS	NS
Bromomethane	<10	<10	<10	<10	<10	<10	<10	NS	NS
Carbon disulfide	<5	<5	<5	<5	<5	<5	<5	NS	NS
Carbon tetrachloride	<5	<5	<5	<5	<5	<5	<5	5	25
Chlorobenzene	<5	<5	<5	<5	<5	<5	<5	NS	NS
Chloroethane	<10	<10	<10	<10	<10	<10	<10	NS	NS
Chloroform	<5	<5	<5	<5	<5	<5	<5	NS	NS
Chloromethane	J<10	J<10	J<10	J<10	J<10	J<10	J<10	NS	NS
Dibromochloromethane	<5	<5	<5	<5	<5	<5	<5	NS	NS
cis-1,3-Dichloropropene	<5	<5	<5	<5	<5	<5	<5	NS	NS
1,1-Dichloroethane	<5	<5	<5	<5	<5	<5	<5	NS	NS
1,2-Dichloroethane	<5	<5	<5	<5	<5	<5	<5	5	25
1,1-Dichloroethene	<5	47	<5	<5	<5	<5	<5	7	35
1,2-Dichloropropane	<5	<5	<5	<5	<5	<5	<5	5	23
Ethylbenzene	<5	<5	<5	<5	<5	<5	<5	700	1000
2-Hexanone	<10	<10	<10	<10	<10	<10	<10	NS	NS
Methylene chloride	<5	<5	<5	<5	<5	<5	<5	NS	NS
2-Butanone (MEK)	<10	<10	<10	<10	<10	<10	<10	NS	NS
4-Methyl-2-pentanone	<10	<10	<10	<10	<10	<10	<10	NS	NS
Styrene	<5	<5	<5	<5	<5	<5	<5	100	500
1,1,2,2-Tetrachloroethane	<5	<5	<5	<5	<5	<5	<5	NS	NS
Tetrachloroethene	<5	<5	<5	<5	<5	<5	<5	5	25
Toluene	<5	<5	<5	<5	<5	<5	<5	1000	2500
1,2-Dichloroethene (total)	<5	J13000	<5	23	17	<5	17	NS	NS
Trans-1,3-dichloropropene	<5	<5	<5	<5	<5	<5	<5	NS	NS
1,1,1-Trichloroethane	<5	<5	<5	<5	<5	<5	<5	200	1000
1,1,2-Trichloroethane	<5	<5	<5	<5	<5	<5	<5	NS	NS
Trichloroethene	<5	110	<5	<5	<5	<5	<5	5	25
Vinyl acetate	<10	<10	<10	<10	<10	<10	<10	NS	NS
Vinyl chloride	<10	J1000	<10	<10	13	<10	14	2	10
Xylenes (total)	<5	<5	<5	<5	<5	<5	<5	10000	10000

\* Sample GMMW-4 is a duplicate of the groundwater sample collected from Monitoring Well GMMW-3.

Light shade indicates that the compound concentration exceeds Illinois Class I Groundwater Quality Standards.

NS indicates that a cleanup objective has not been specified for the compound.

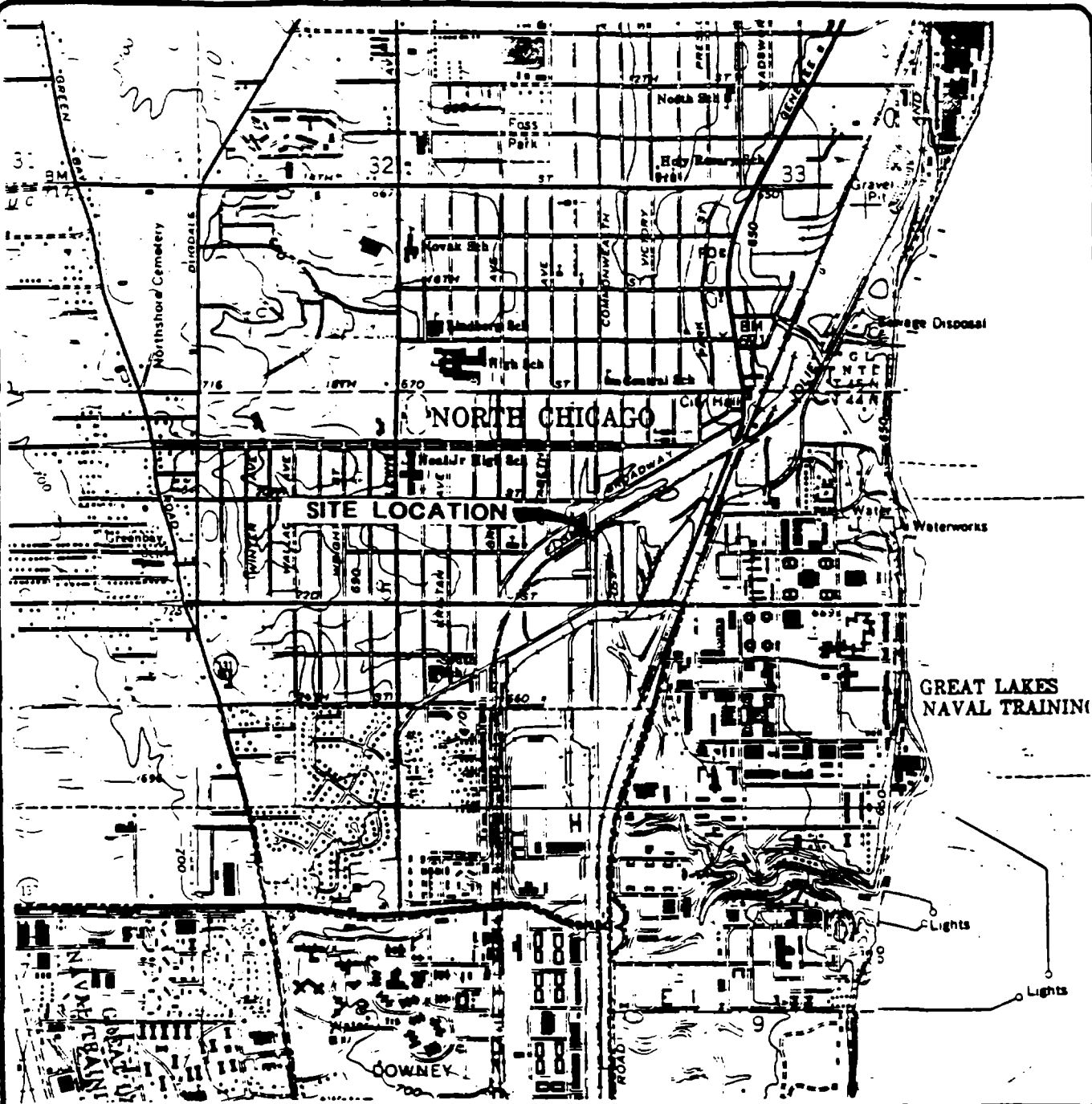
J Concentration or detection limit is estimated based on validation of data.

## FIGURES

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DWD DATE: 1/24/94 | PROJECT NO.: C0325.001 | FILE NO.: TRUST-1.0WG DRAWING: C32501-F01-1 | CHECKED: G. CIPRIANO | APPROVED: G. CIPRIANO | DRAFTER: S. GOWAR 1-1

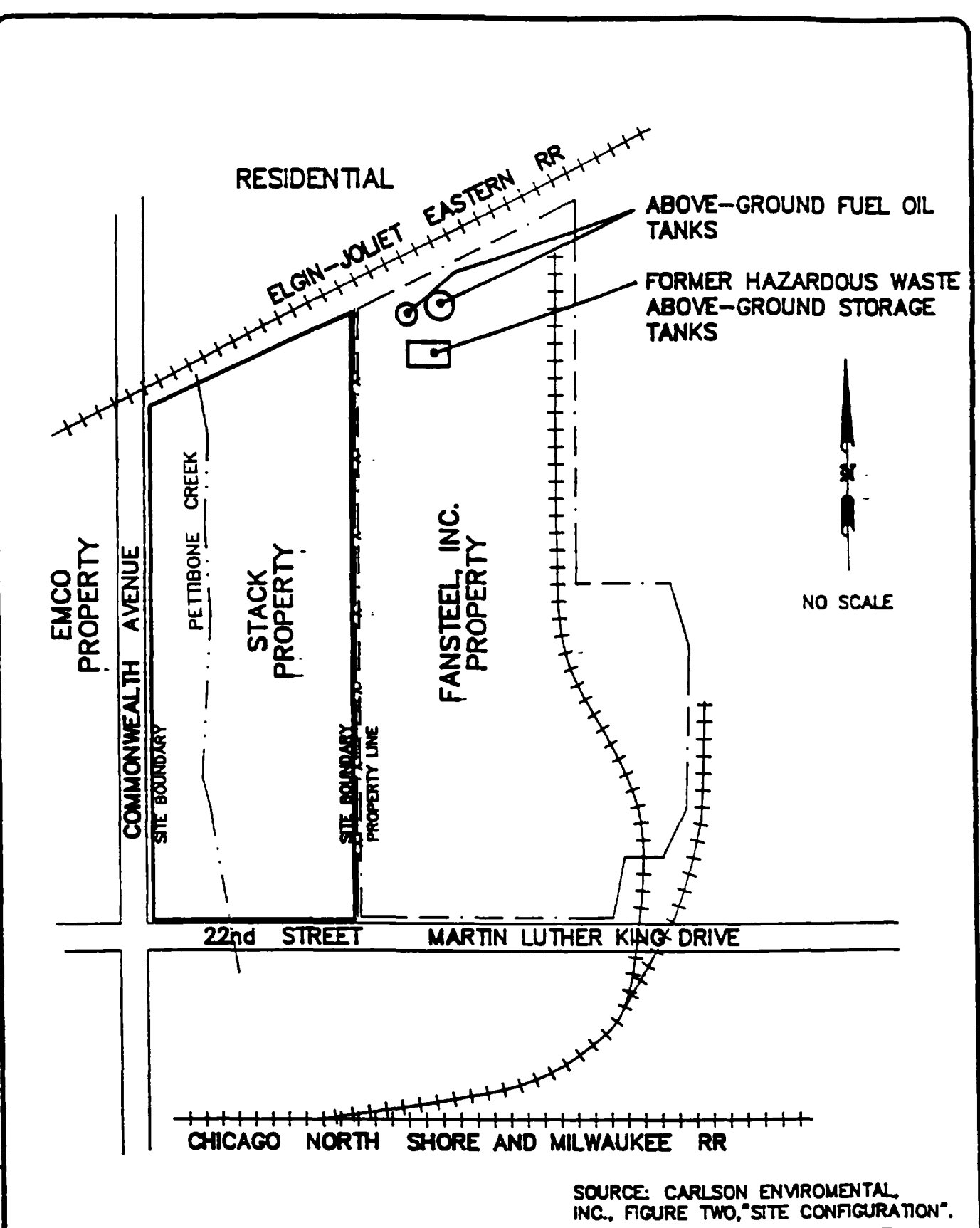


SOURCE: USGS 7.5 MIN. TOPOGRAPHIC MAP, WAUKEGAN, ILLINOIS QUADRANGLE, 1960, PHOTOREVISED 1972 AND 1980.



**SITE LOCATION MAP**  
 STACK PROPERTY, NORTH CHICAGO, ILLINOIS  
 THE NORTHERN TRUST BANK  
 LAKE FOREST, ILLINOIS

FIGURE  
 1-1



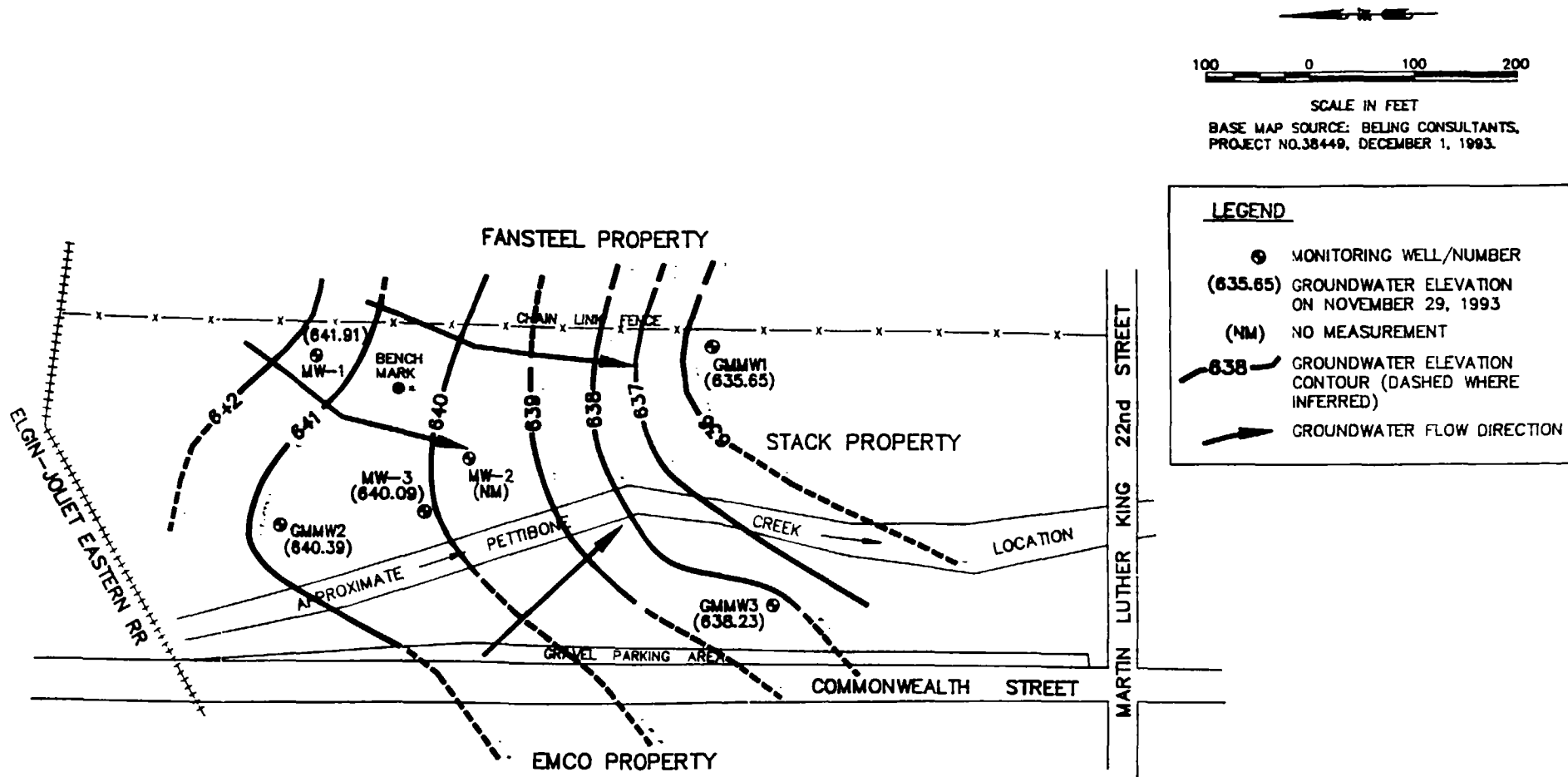
SOURCE: CARLSON ENVIRONMENTAL INC., FIGURE TWO, "SITE CONFIGURATION".

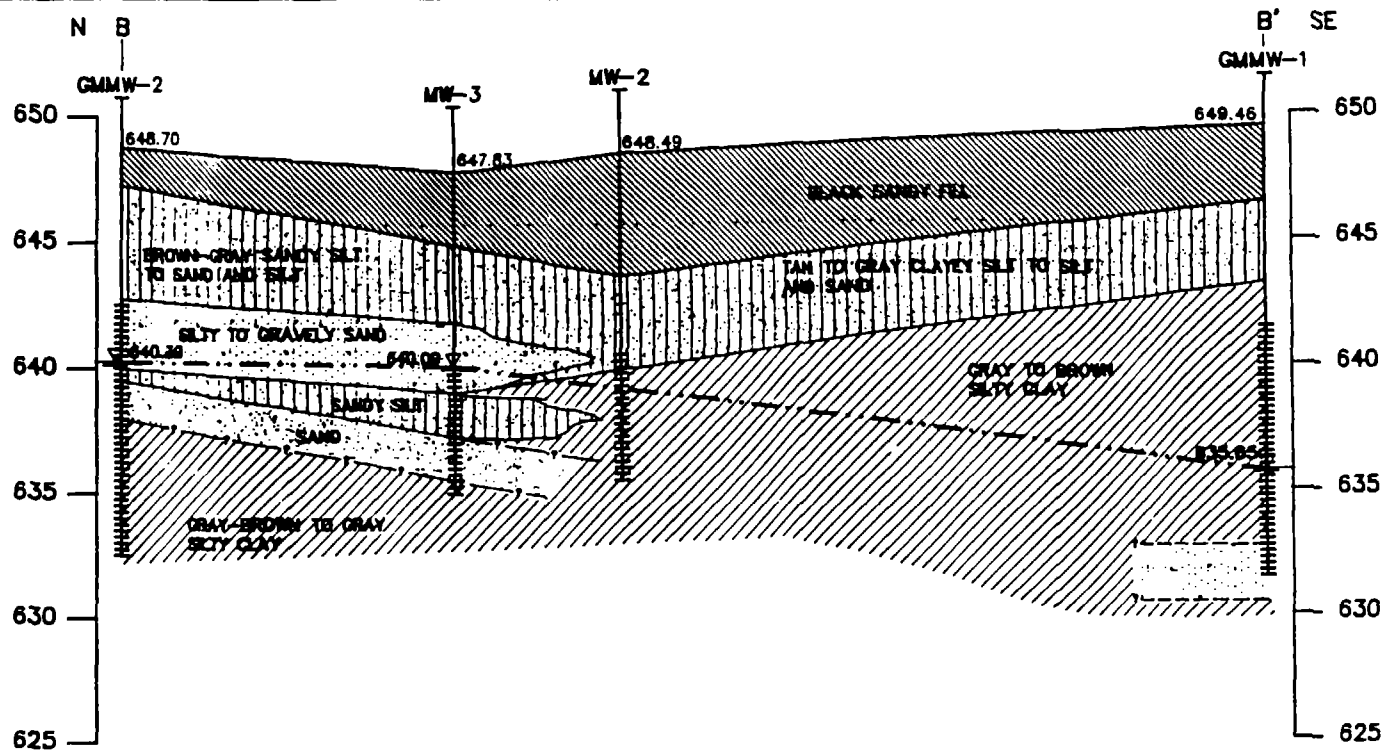


**SITE LAYOUT**  
 STACK PROPERTY, NORTH CHICAGO, ILLINOIS  
 THE NORTHERN TRUST BANK  
 LAKE FOREST, ILLINOIS








FIGURE  
 1-2







# LEGEND

- 640.09  GROUNDWATER LEVEL AND ELEVATION
-  SILTY CLAY
-  SANDY SILT TO SILT AND SAND
-  SAND
-  SAND AND GRAVEL
-  SLAG/FLY ASH FILL MATERIAL
-  MONITORING WELL

SCALE: HORIZONTAL 1"=50'  
VERTICAL 1"=5'



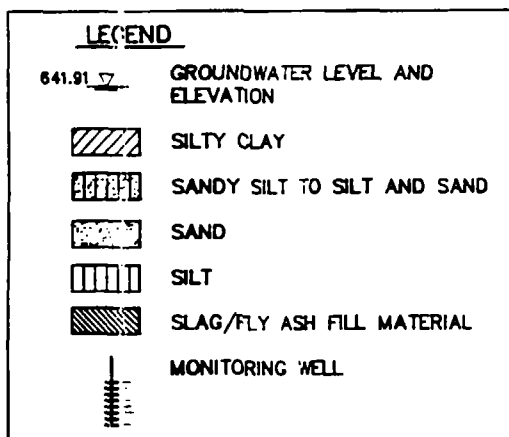
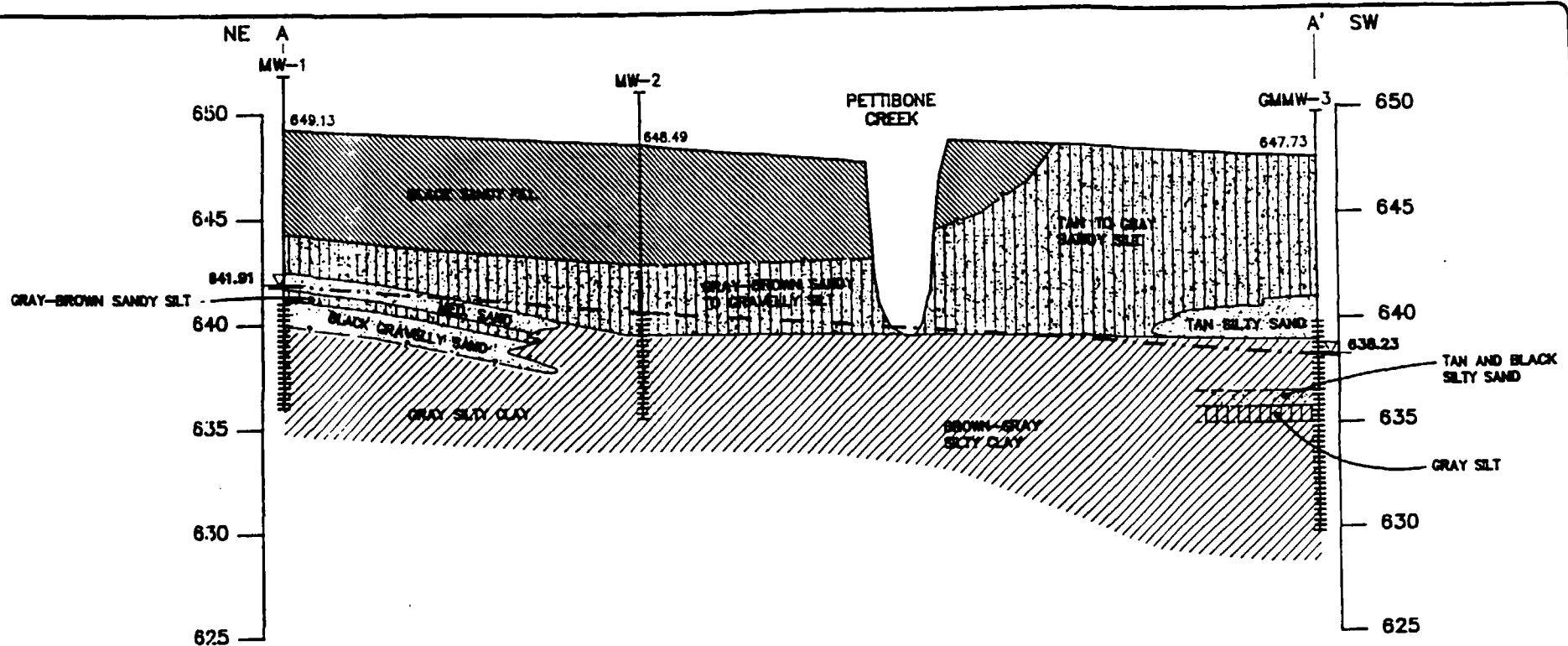
## HYDROGEOLOGIC CROSS-SECTION B-B'

STACK PROPERTY, NORTH CHICAGO, ILLINOIS  
THE NORTHERN TRUST BANK  
LAKE FOREST, ILLINOIS

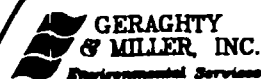
FIGURE

3-2

DATE: 1/24/94 PROJECT NO.: 003225.001 FILE NO.: TRUST/ALDING DRAINING CLOSING - PROS - 1 CHECKED: L. CHAVIN APPROVED: S. SCHWAB DRAFTER: S. SCHWAB 1-90

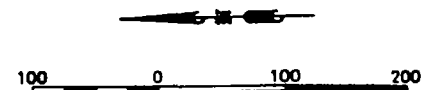


SCALE: HORIZONTAL 1"=50'  
VERTICAL 1"=5'



**HYDROGEOLOGIC CROSS-SECTION A-A'**  
STACK PROPERTY, NORTH CHICAGO, ILLINOIS  
THE NORTHERN TRUST BANK  
LAKE FOREST, ILLINOIS

FIGURE  
3-1

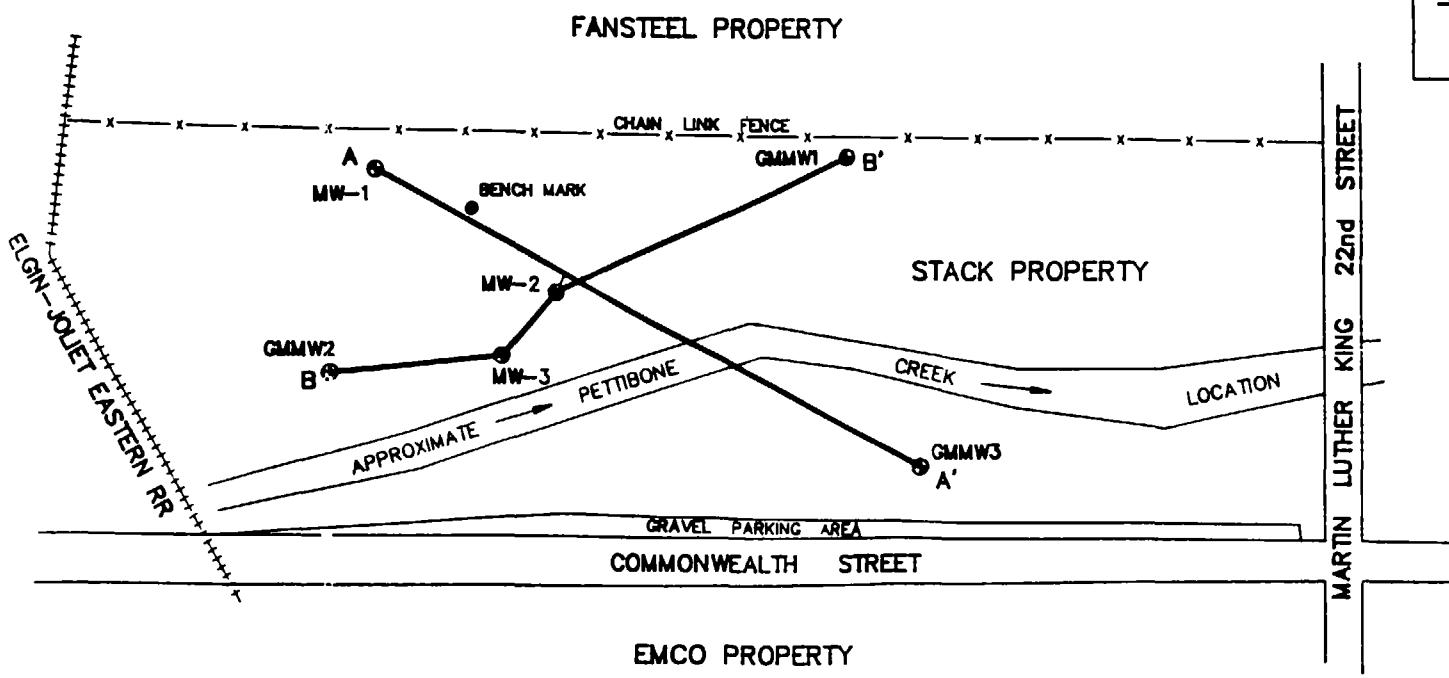


SCALE IN FEET

BASE MAP SOURCE: BELING CONSULTANTS,  
PROJECT NO.38449, DECEMBER 1, 1993.

LEGEND

● MONITORING WELL/NUMBER



**MONITORING WELL AND CROSS-SECTION LOCATION MAP**

STACK PROPERTY, NORTH CHICAGO, ILLINOIS  
THE NORTHERN TRUST BANK  
LAKE FOREST, ILLINOIS

FIGURE  
2-1

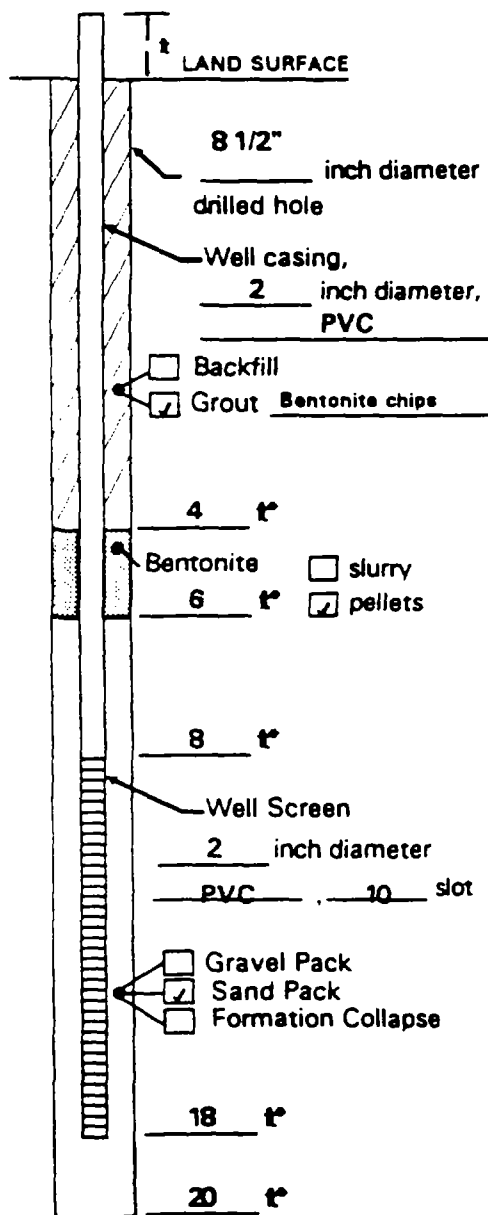
APPENDIX A

**APPENDIX A**

**Monitoring Well and Soil Boring Logs**



# WELL CONSTRUCTION LOG (UNCONSOLIDATED)



Measuring Point is  
Top of Well Casing  
Unless Otherwise Noted.

\*Depth Below Land Surface

Project Stack Property Well GMMW-1

Town/City North Chicago

County Lake State Illinois

Permit No. \_\_\_\_\_

Land-Surface Elevation 649.46 feet ☒ Surveyed  
and Datum \_\_\_\_\_ ☐ Estimated

NAVD \_\_\_\_\_

Installation Date(s) November 19, 1993

Drilling Method Hollow stem auger

Drilling Contractor Rock & Soil Drilling Corp.

Drilling Fluid None

Development Technique(s) and Date(s)

PVC bailer and nylon rope.

November 22, 1993.

Fluid Loss During Drilling None gallons

Water Removed During Development 4.0 gallons

Static Depth to Water 16.99 feet below M.P.

Pumping Depth to Water N/A feet below M.P.

Pumping Duration 0.75 hours

Yield \_\_\_\_\_ gpm Date \_\_\_\_\_

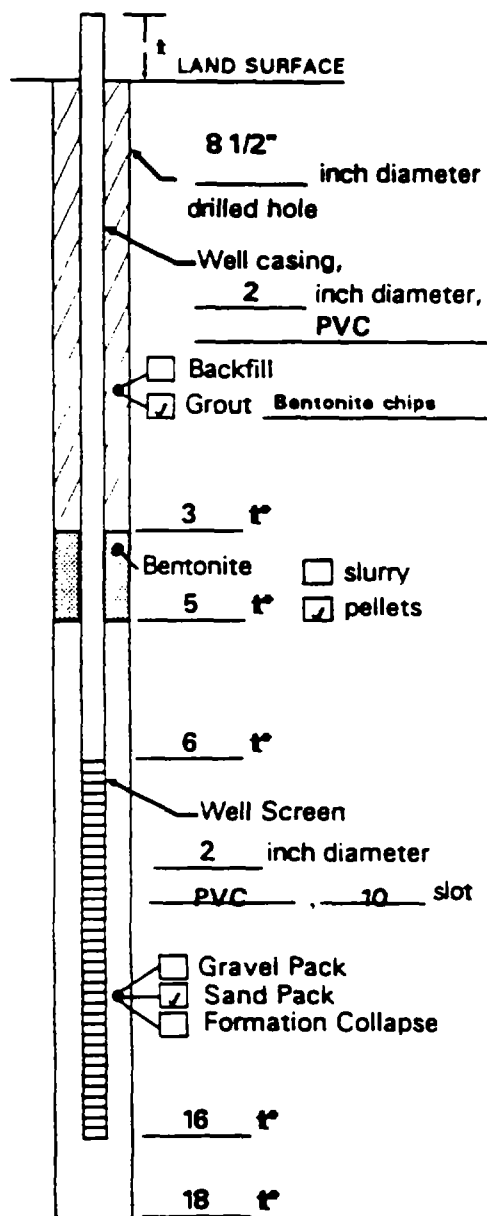
Specific Capacity \_\_\_\_\_ gpm/ft

Well Purpose Groundwater quality monitoring, flow direction.

Remarks Sandpack is medium grained silica sand by Morie Co.

Prepared by Douglas K. Cowin

# WELL CONSTRUCTION LOG (UNCONSOLIDATED)



Measuring Point is  
Top of Well Casing  
Unless Otherwise Noted.

\*Depth Below Land Surface

Project Stack Property Well GMMW-2

Town/City North Chicago

County Lake State Illinois

Permit No. \_\_\_\_\_

Land-Surface Elevation 648.70 feet ☒ Surveyed  
☐ Estimated

NAVD

Installation Date(s) November 19, 1993

Drilling Method Hollow stem auger.

Drilling Contractor Rock & Soil Drilling Corp.

Drilling Fluid None

Development Technique(s) and Date(s)

PVC bailer and nylon rope.

November 22, 1993.

Fluid Loss During Drilling None gallons

Water Removed During Development 120 gallons

Static Depth to Water 7.51 feet below M.P.

Pumping Depth to Water N/A feet below M.P.

Pumping Duration 0.5 hours

Yield \_\_\_\_\_ gpm Date \_\_\_\_\_

Specific Capacity \_\_\_\_\_ gpm/ft

Well Purpose Groundwater quality monitoring, flow direction.

Remarks \_\_\_\_\_

Prepared by Douglas K. Cowin



# SAMPLE/CORE LOG

Boring/Well GMMW-1 Project/No. Stack Property/CI0325.001 Page 1 of 2  
 Site Location North Chicago Drilling Started 11/19/93 Drilling Complete 11/19/93  
 Total Depth Drilled 20 feet Hole Diameter 8 1/2 inches Type of Sample/  
 Length and Diameter of Coring Device 2" x 2' Coring Device Split Spoon  
 Sampling Interval Continuous feet  
 Land-Surface Elev. 649.46 feet ☒ Surveyed ☐ Estimated Datum NAVD  
 Drilling Fluid Used None Drilling Method Hollow stem auger  
 Drilling Contractor Rock & Soil Drilling Corp. Driller Tim Helper Scott  
 Prepared By Doug Cowin Hammer Weight 140 Hammer Drop 30 inches

Sample/Core Depth (feet below land surface)		Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description	HNU
From	To				
0	2	15"	3/2/3/4	Loose, fine to medium grain, black to tan, silty sand appearance of slag.	0
2	4	0	50/5"	Drove cobble.	0
4	6	19"	10/18/18/ 15	Upper 11": Tan to peach to gray, clayey silt, 10-15% component of coarse sand, moist. [Black, slough organic soil at tip.] Lower 8": Same as above, more sand 50%.	0
6	8	14"	11/15/23 26	Upper 4": Tan silt, well sorted, moist lacustrine appearance. Lower 10": Silty clay with little sand, coarse, rounded, brown (till) silty lenses, moist.	0
8	10	19"	6/12/14/17	Grayish brown clay, little coarse sand, stiff, moist. Silty lens at 8 1/2 ft is subvertical, rust color.	
10	12	23"	3/6/13/15	Same as above. Rust-color lens (1/8") at 11 ft. connecting vertical crack.	0
12	14	24"	8/11/12/12	Brownish gray, same as above. Lens of fine sand (1") at 13.5 ft is not saturated.	0
14	16	24"	5/9/11/16	Same as above. Lenses of fine sand at 14.1 ft and 15.8 ft; not saturated.	

# SAMPLE/CORE LOG

**Boring/Well**    **GMMW-1**

Page 2 of 2

Prepared  
By Doug Cowin

Sample/Core Depth (feet below land surface)		Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description	HMU
From	To				
16	18	23"	12/10/13 12	Upper 8": Same as above.  Lower 15": Fine to coarse sand and gravel, little silt, wet, gray to black to white grains.	0
18	20	22"	7/9/12/15	Upper 13": Same as above.  Lower 9": Very tight brown clay, no inclusions.	0

# SAMPLE/CORE LOG

Boring/Well GMMW-2 Project/No. Stack Property / C10325.001 Page 1 of 2  
 Site Location North Chicago Drilling Started 11/19/93 Drilling Complete 11/19/93  
 Total Depth Drilled 18.0 feet Hole Diameter 8 1/2 inches Type of Sample/ Coring Device Split Spoon  
 Length and Diameter of Coring Device 2" x 2' Sampling Interval Continuous feet  
 Land-Surface Elev. 648.70 feet ☒ Surveyed ☐ Estimated Datum NAVD  
 Drilling Fluid Used None Drilling Method Hollow stem auger  
 Drilling Contractor Rock & Soil Drilling Corp. Driller Tim Helper Scott  
 Prepared By Doug Cowin Hammer Weight 140 Hammer Drop 30 inches

Sample/Core Depth (feet below land surface)		Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description	HNU
From	To				
0	2	19	1/8/14/9	Upper 17": Black to dark brown fine to medium grain slag appearing material/fly ash, moist, loose, sandy. Lower 2": Silt grain size.	0
2	4	16	4/7/9/11	Black silt, some clay, little coarse sand, plastic, moist. Lower 3" becoming green/gray mottled silt.	0
4	6	17	5/6/8/9	Tan to gray mottled silty fine sand/fine sandy silt, loose, moist. Lower 2" becoming more clayey.	0
6	8	1"	12/18/16 24	Loose, tan, fine sand, moist, little rounded coarse sand.	0
8	10	17"	5/11/10/12	Upper 5": Same as above. Upper middle 1": Lens of gray silt. Lower middle 3": Fine to coarse sand and gravel, wet, tan to gray to green (glauconite?) Lower 5": Silt. Tip: black to white to gray, fine to coarse sand, wet. Same appearance as sand at MW-1.	0
10	12	17"	4/5/7/11	Upper 7": Same as above. Lower 10": Grayish brown clay with trace coarse sand (fill), stiff, slightly plastic.	0
12	14	22"	5/7/13/17	Same as above.	0

## SAMPLE/CORE LOG

Boring/Well **GMMW-2**

Page 2 of 2

Prepared  
By Doug Cowin

[illegible]

# SAMPLE/CORE LOG

Boring/Well GMMW-3 Project/No. Stack Property/ CI0325.001 Page 1 of 2

Site Location North Chicago Drilling Started 11/19/93 Drilling Complete 11/19/93

Total Depth Drilled 18.0 feet Hole Diameter 8 1/2 inches Type of Sample/ Coring Device Split Spoon

Length and Diameter of Coring Device 2" x 2' Sampling Interval Continuous feet

Land-Surface Elev. 647.73 feet ☒ Surveyed ☐ Estimated Datum NAVD

Drilling Fluid Used None Drilling Method Hollow stem auger

Drilling Contractor Rock & Soil Drilling Corp. Driller Tim Helper Scott

Prepared By Doug Cowin Hammer Weight 140 Hammer Drop 30 inches

Sample/Core Depth (feet below land surface)		Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description	HNU
From	To				
0	2	10"	3/6/15/15	Upper 5": Black organic silty soil, moist. Lower 5": Tan to rust color fine sandy silt, little pebbles, rounded, moist, plastic.	0
2	4	15"	6/5/8/10	Same as above.	0
4	6	15"	4/4/4/6	Same as above, becoming mottled with gray silt at 5.5 ft. Observe glass shard at 5 ft.	0
6	8	20"	5/8/9/14	Upper 11": Same as above. Lower 10": Tan, laminated, silty fine sand, moist, very well sorted.	0
8	10	24"	5/10/10/11	Upper 9": Same as above, darker tan. Lower 15": Tan, silty clay, moist, plastic, slightly mottled, lower 5" more gray mottles. Very well sorted.	0
10	12	17"	4/6/10/16	Upper 12": Same as above. Lower 5": Tan and black very finely laminated silty fine sand, loose, moist, lacustrine appearance.	0
12	14	23"	6/7/9/9	Upper 6": Gray, laminated silt, moist to wet, little fine sand. Lower 17": Brownish gray clay, stiff, slightly moist, little coarse sand and gravel (till).	0

## SAMPLE/CORE LOG

Boring/Well GMMW-3Page 2 of 2

Prepared  
By Doug Cowin

[illegible]

APPENDIX B

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## **APPENDIX B**

### **Data Validation and Laboratory Groundwater Analytical Results**





**APPENDIX B**

**ANALYTICAL LABORATORY DATA VALIDATION  
NORTHERN TRUST STACK PROPERTY  
CHICAGO, ILLINOIS**



## QUALITY ASSURANCE SUMMARY

This report presents the review and validation of sample data contained within the Sample Delivery Group (SDG) for the Northern Trust Stack Property located in Chicago, Illinois. The review and validation determined the validity of data from groundwater samples obtained during November 29, 1993. Samples were sent, by overnight express courier, to Heritage Laboratories, Inc. (Heritage) located in Indianapolis, Indiana for analysis. Analytical tests included volatile organics analysis (VOA) and metals. Analyses followed methods specified in the chain-of-custody forms submitted with the samples. The methods selected for analysis are from the United States Environmental Protection Agency (USEPA) document "Test Methods for Evaluating Solid Waste, Physical and Chemical Methods" (USEPA 1986). Data were evaluated in accordance with the data quality objectives (DQOs) set forth in the Geraghty & Miller Level III Laboratory Reportables. The data validation followed rules from "Functional Guidelines for Evaluating Inorganics Analyses" (USEPA 1988) and "Functional Guidelines for Evaluating Organics Analyses" (USEPA 1988). Data review did not include the examination of raw data and/or some calibrations.

The data validation and review process followed the scheme set forth in the USEPA guidelines. Each validation parameter had certain criteria against which the data were evaluated. Each criterium was judged by the experience of the validator whether the effect, positive or negative, influenced the usability of the data. The goal of this data validation process was to ensure the integrity of the data that will be usable, not to arbitrarily disqualify data. Data were qualified at one of three levels of data usability:

**Qualitative (Level A)** data have failed some quality assurance function and have been given an estimated (J) flag. Data were somewhat suspect but may be used in the decision-making process. *Qualitative data should not be used for remediation activities.*

**Quantitative (Level B)** data must meet all specified quality assurance functions. These data have no qualifications and may be used for any purpose.



**Unusable** data have failed the requirements within the quality assurance framework at significant levels. These data must not be used for any purpose. These data will be flagged as "R" on reports.

Analytical data in these SDGs were judged against the above list and against the type of matrix and the location of samples to ascertain usability. Sample data were reviewed in accordance with the matrix type (soil/water), category (organic/inorganic), and analytical procedure group (metals/volatiles/semivolatiles).

## **ORGANICS SUMMARY**

### **Volatile Organics Analysis**

The samples were analyzed within acceptable holding times. The surrogates and internal standard compounds were outside the limits on sample GMMW-1. Subsequent reanalysis of GMMW-1 by Heritage was acceptable and the second data package was reported. Sample MW-3 had high results for several compounds of interest on the first analysis of December 8, 1993. MW-3 was diluted and reanalyzed by Heritage. Both sets of data are reported, however, the diluted analysis results are qualified as estimated (J) values due to the dilution. Other significant quality assurance failures in the VOA were not noted during the data review and validation. Details of the variances are discussed in the following sections.



## **INORGANIC SUMMARY**

### **Metals**

The samples were analyzed within acceptable holding times. The restate (field) blank contained boron at 0.084 milligrams per Liter (mg/L). No other contaminants were noted in the blanks associated with the data package. The inductively coupled plasma (ICP) interference check sample ran on December 6, 1993 has copper recovery at 127 percent (%). Since all copper results were less than the instrument detection limit (IDL), no data were qualified. The ICP serial dilution results show that calcium, iron, and manganese exceed the dilution recovery percent. Data associated with these results were qualified as estimated (J). Other significant quality assurance failures were not noted in these data packages. Details of the quality assurance review are provided in the following sections.

### **VOLATILE ORGANICS**

#### **HOLDING TIMES**

Holding times were acceptable for all samples.

#### **GAS CHROMATOGRAPHY/MASS SPECTROSCOPY INSTRUMENT TUNING**

The instrument tuning criteria were acceptable for all samples.



**CALIBRATION****Initial**

The initial calibrations were acceptable for all samples

**Continuing**

Some minor quality assurance failures within the continuing calibration data were noted. The following are the quality assurance failures and associated samples.

**Date:** December 8, 1993  
**Instrument:** GC/MS VOA  
**Samples Affected:** GMMW-3, GMMW-4, GMMW-1, GMMW-2, MW-1, MW-3,  
**Reinstate**

<u>Constituent</u>	<u>Quality Assurance Failure</u>
Chloromethane	25.8 percent difference (%D)

**Date:** December 9, 1993  
**Instrument:** GC/MS VOA  
**Samples Affected:** GMMW-1.

<u>Constituent</u>	<u>Quality Assurance Failure</u>
Dichlorodifluoromethane	46.4 %D

**Date:** December 10, 1993  
**Instrument:** GC/MS VOA  
**Samples Affected:** MW-3.

<u>Constituent</u>	<u>Quality Assurance Failure</u>
Dichlorodifluoromethane	41.0 %D



Analytical results associated with the above calibration constituents were qualified as estimated (J).

## **BLANKS**

### **Method Blank**

Contaminants were not noted in the method blanks.

### **Field Blank**

Contaminants were not noted in the field blank.

## **SURROGATE RECOVERY**

Sample GMMW-1 failed all three surrogate recovery limits. Subsequent reanalysis (December 9, 1993) of GMMW-1 was acceptable. The second analysis results are reported and should be used for project purposes. All other surrogates were acceptable on the first analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE (MS/MSD)**

Sample GMMW-2 was used for MS/MSD purposes. Toluene analytical results from December 9, 1993 were outside the percent recovery limits. Since MS/MSD limits are advisory and the surrogate results are acceptable, qualification of the associated data was not required. MS/MSD results for all other days were acceptable.

## **INTERNAL STANDARDS**

GMMW-1 internal standard results were outside acceptance limits for the December 8, 1993 analysis. Subsequent reanalysis of the sample on December 9, 1993 produced acceptable results.



## **INORGANICS - METALS**

### **HOLDING TIMES**

The sample holding times were acceptable.

### **CALIBRATION**

#### **Initial Calibration**

The initial calibration results were acceptable for all samples.

#### **Continuing Calibration**

The continuing calibration results are acceptable for all samples.



**BLANKS****Initial Calibration Blanks**

No contaminants were noted in the blanks.

**Continuing Calibration Blanks**

No contaminants were noted in the blanks.

**Preparation Blanks**

No contaminants were noted in the preparation blanks.

**Reinstate (Field) Blank**

No contaminants were noted in the field blank.

**INDUCTIVELY COUPLED PLASMA INTERFERENCE CHECK SAMPLE**

Copper results from the December 6, 1993 analyses were outside the interference check samples limits. Data greater than the instrument detection limits (IDLs) should be qualified as estimated (J). All data associated with this result are less than the IDL, therefore sample results were not qualified. All other quality assurance results were acceptable.

**LABORATORY CONTROL SAMPLE**

Laboratory control sample results were acceptable.

**LABORATORY DUPLICATE**

GMMW-2 was used for the laboratory duplicate. The RPD was acceptable.





**MATRIX SPIKE**

Sample GMMW-2 was used for MS purposes. The analytical results for the MS are acceptable.

**INDUCTIVELY COUPLED PLASMA SERIAL DILUTION**

Calcium, iron, and manganese exceed the dilution check sample acceptance limits. The data associated with these elements are qualified as estimated (J).



## **CONCLUSION**

Overall, the data reported in the packages were acceptable for use within the limitation of the validation (Geraghty & Miller Level III). Other quality assurance variances may not have been noted in this review that may be seen in the context of reviewing the raw data.



# CERTIFICATE OF ANALYSIS

<b>Service Location</b> HERITAGE LABORATORIES, INC. 7901 W. MORRIS ST. INDIANAPOLIS, IN 46231 (317)243-8305	<b>Received</b>	<b>Project</b>	<b>Lab ID</b>
	30-NOV-93		A297725
	<b>Complete</b>	<b>PO Number</b>	
	22-DEC-93	C10325.001	
	<b>Printed</b>	<b>Sampled</b>	
	23-DEC-93	29-NOV-93 13:10	

<b>Report To</b>	<b>Bill To</b>
GARY CIPRIANO GERAGHTY & MILLER, INC., SUITE 1000 35 E. WACKER DRIVE CHICAGO, IL 60601	GARY CIPRIANO GERAGHTY & MILLER, INC., 35 E. WACKER DRIVE CHICAGO, IL 60601

<b>Sample Description</b>
DESCRIPTION: MW-1 LOCATION: STACK PROPERTY - NORTH CHICAGO

## VOLATILE ORGANICS SW846-8240A

Analyst: G. WILSON

Analysis Date: 08-DEC-93 12:52 Instrument: GC/MS VOA

Test: 0510.3.0

Parameter	Result	Det. Limit	Units
ACETONE	BDL	20	ug/L
BENZENE	BDL	5	ug/L
BROMODICHLOROMETHANE	BDL	5	ug/L
BROMOFORM	BDL	5	ug/L
BROMOMETHANE	BDL	10	ug/L
CARBON DISULFIDE	BDL	5	ug/L
CARBON TETRACHLORIDE	BDL	5	ug/L
CHLOROBENZENE	BDL	5	ug/L
CHLOROETHANE	BDL	10	ug/L
CHLOROFORM	BDL	5	ug/L
CHLOROMETHANE	BDL	10	ug/L
DIBROMOCHLOROMETHANE	BDL	5	ug/L
CIS-1,3-DICHLOROPROPENE	BDL	5	ug/L
1,1-DICHLOROETHANE	BDL	5	ug/L
1,2-DICHLOROETHANE	BDL	5	ug/L
1,1-DICHLOROETHENE	BDL	5	ug/L
1,2-DICHLOROPROPANE	BDL	5	ug/L
ETHYL BENZENE	BDL	5	ug/L
2-HEXANONE	BDL	10	ug/L
DICHLOROMETHANE (METHYLENE CHLORIDE)	BDL	5	ug/L
METHYL ETHYL KETONE	BDL	10	ug/L
4-METHYL-2-PENTANONE	BDL	10	ug/L
STYRENE	BDL	5	ug/L
1,1,2,2-TETRACHLOROETHANE	BDL	5	ug/L
TETRACHLOROETHENE	BDL	5	ug/L
TOLUENE	BDL	5	ug/L
1,2-DICHLOROETHENE (CIS AND TRANS)	BDL	5	ug/L
TRANS-1,3-DICHLOROPROPENE	BDL	5	ug/L
1,1,1-TRICHLOROETHANE	BDL	5	ug/L
1,1,2-TRICHLOROETHANE	BDL	5	ug/L
TRICHLOROETHENE	BDL	5	ug/L
VINYL ACETATE	BDL	10	ug/L
VINYL CHLORIDE	BDL	10	ug/L
XYLENES (O/M/P-XYLENE)	BDL	5	ug/L

Parameter	Result	Det. Limit	Units
SURROGATE RECOVERY			
DICHLOROETHANE-D4	102		% Rec
TOLUENE-D8	98		% Rec
4-BROMOFLUOROBENZENE	104		% Rec

## FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A

Analyst: E. MERRILL

Analysis Date: 02-DEC-93

Test: P130.4.0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	50		mL
FINAL VOLUME	50		mL

## ALUMINUM ICP SW846-6010A

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M1013.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
ALUMINUM	BDL	0.050	mg/L

## ANTIMONY ICP SW846-6010A

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M1023.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
ANTIMONY	BDL	0.030	mg/L

## BARIUM ICP SW846-6010A

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M1043.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
BARIUM	0.089	0.010	mg/L

## BERYLLIUM ICP SW846-6010A

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M1053.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
BERYLLIUM	BDL	0.0050	mg/L

## BORON ICP SW846-6010A

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M1073.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
BORON	0.73	0.050	mg/L

## CALCIUM ICP SW846-6010A

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M1093.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
CALCIUM	120	0.20	mg/L

## CHROMIUM ICP SW846-6010A

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M1103.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
CHROMIUM	BDL	0.010	mg/L

**COBALT ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M119.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
COBALT	BDL	0.010	mg/L

**COPPER ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M112.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
COPPER	0.028	0.020	mg/L

**IRON ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M119.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
IRON	BDL	0.025	mg/L

**MAGNESIUM ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M118.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
MAGNESIUM	32.	0.20	mg/L

**MANGANESE ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M119.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
MANGANESE	0.048	0.010	mg/L

**NICKEL ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M122.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
NICKEL	BDL	0.010	mg/L

**POTASSIUM ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M126.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
POTASSIUM	21.	0.20	mg/L

**SILVER ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M130.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
SILVER	BDL	0.010	mg/L

**SODIUM ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M131.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
SODIUM	42.	0.20	mg/L

**VANADIUM ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M138.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
VANADIUM	BDL	0.010	mg/L

**ZINC ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M139.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
ZINC	0.26	0.020	mg/L

**GFAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-3020A**

Analyst: R. BYERS

Analysis Date: 07-DEC-93

Test: P130.6.0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	50		mL
FINAL VOLUME	50		mL

**ARSENIC GFAA SW846-7060**

Analyst: M. HEMMERLEIN

Analysis Date: 20-DEC-93

Instrument: GFAA

Test: M103.2.0

Prep: GFAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-3020A P130.6.0

Parameter	Result	Det. Limit	Units
ARSENIC	BDL	0.0050	mg/L

**CADMIUM TRACE ICP SW846-6010A**

Analyst: J. WALLACE

Analysis Date: 21-DEC-93

Instrument: ICP

Test: M108.0.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
CADMIUM	0.0019	0.0010	mg/L

**LEAD TRACE ICP SW846-6010A**

Analyst: J. WALLACE

Analysis Date: 21-DEC-93

Instrument: ICP

Test: M116.0.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
LEAD	BDL	0.0050	mg/L

**THALLIUM GFAA SW846-7841**

Analyst: A. ROBERTSON

Analysis Date: 12-DEC-93

Instrument: GFAA

Test: M134.2.0

Prep: GFAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-3020A P130.6.0

Parameter	Result	Det. Limit	Units
THALLIUM	BDL	0.020	mg/L

1:4 DILUTION

**SELENIUM GFAA SW846-7740**

Analyst: A. ROBERTSON

Analysis Date: 20-DEC-93

Instrument: GFAA

Test: M128.2.0

Prep: GFAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-3020A P130.6.0

Parameter	Result	Det. Limit	Units
SELENIUM	BDL	0.0050	mg/L

**MERCURY CVAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-7470**

Analyst: G. MAPP

Analysis Date: 01-DEC-93

Test: P131.6.0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	100		mL
FINAL VOLUME	100		mL

**MERCURY CVAA SW846-7470**

Analyst: G. MAPP

Analysis Date: 07-DEC-93

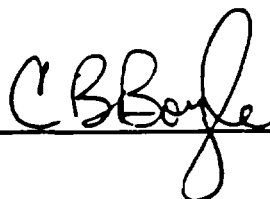
Instrument: CVAA

Test: M120.1.0

Prep: MERCURY CVAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-7470 P131.6.0

Parameter	Result	Det. Limit	Units
MERCURY	BDL	0.00050	mg/L

## Sample Comments

*BDL Below Detection Limit**IDEM Drinking Water Certification Number C-49-01**This Certificate shall not be reproduced, except in full,  
without the written approval of the lab.*

# C E R T I F I C A T E   O F   A N A L Y S I S

<b>Service Location</b> HERITAGE LABORATORIES, INC. 7901 W. MORRIS ST. INDIANAPOLIS, IN 46231 (317)243-8305	<b>Received</b>	<b>Project</b>	<b>Lab ID</b>
	30-NOV-93		A297726
	<b>Complete</b>	<b>PO Number</b>	
	22-DEC-93	CI0325.001	
	<b>Printed</b>	<b>Sampled</b>	
	23-DEC-93	29-NOV-93 15:35	

<b>Report To</b>	<b>Bill To</b>
GARY CIPRIANO GERAGHTY & MILLER, INC., SUITE 1000 35 E. WACKER DRIVE CHICAGO, IL 60601	GARY CIPRIANO GERAGHTY & MILLER, INC., 35 E. WACKER DRIVE CHICAGO, IL 60601
<b>Sample Description</b> DESCRIPTION: MW-3 LOCATION: STACK PROPERTY - NORTH CHICAGO	

## VOLATILE ORGANICS SW846-8240A

Analyst: G. WILSON

Analysis Date: 08-DEC-93 13:40 Instrument: GC/MS VOA

Test: 0510.3.0

Parameter	Result	Det. Limit	Units
ACETONE	BDL	20	ug/L
BENZENE	BDL	5	ug/L
BROMODICHLOROMETHANE	BDL	5	ug/L
BROMOFORM	BDL	5	ug/L
BROMOMETHANE	BDL	10	ug/L
CARBON DISULFIDE	BDL	5	ug/L
CARBON TETRACHLORIDE	BDL	5	ug/L
CHLOROBENZENE	BDL	5	ug/L
CHLOROETHANE	BDL	10	ug/L
CHLOROFORM	BDL	5	ug/L
CHLOROMETHANE	BDL	10	ug/L
DIBROMOCHLOROMETHANE	BDL	5	ug/L
CIS-1,3-DICHLOROPROPENE	BDL	5	ug/L
1,1-DICHLOROETHANE	BDL	5	ug/L
1,2-DICHLOROETHANE	BDL	5	ug/L
1,1-DICHLOROETHENE	47	5	ug/L
1,2-DICHLOROPROPANE	BDL	5	ug/L
ETHYL BENZENE	BDL	5	ug/L
2-HEXANONE	BDL	10	ug/L
DICHLOROMETHANE (METHYLENE CHLORIDE)	BDL	5	ug/L
METHYL ETHYL KETONE	BDL	10	ug/L
4-METHYL-2-PENTANONE	BDL	10	ug/L
STYRENE	BDL	5	ug/L
1,1,2,2-TETRACHLOROETHANE	BDL	5	ug/L
TETRACHLOROETHENE	BDL	5	ug/L
TOLUENE	BDL	5	ug/L
1,2-DICHLOROETHENE (CIS AND TRANS)	EST 5700	5	ug/L
TRANS-1,3-DICHLOROPROPENE	BDL	5	ug/L
1,1,1-TRICHLOROETHANE	BDL	5	ug/L
1,1,2-TRICHLOROETHANE	BDL	5	ug/L
TRICHLOROETHENE	110	5	ug/L
VINYL ACETATE	BDL	10	ug/L
VINYL CHLORIDE	EST 1400	10	ug/L
XYLENES (O/M/P-XYLENE)	BDL	5	ug/L



Parameter	Result	Det. Limit	Units
... SURROGATE RECOVERY			
-----			
DICHLOROETHANE-D4	102		% Rec
TOLUENE-D8	96		% Rec
4-BROMOFLUOROBENZENE	107		% Rec
Dilution necessary due to high concentration of target compounds.			

## VOLATILE ORGANICS SW846-8240A

Analyst: G. WILSON

Analysis Date: 10-DEC-93 14:44 Instrument: GC/MS VOA

Test: 0510.3.1

Parameter	Result	Det. Limit	Units
ACETONE	BDL	2000	ug/L
BENZENE	BDL	500	ug/L
BROMODICHLOROMETHANE	BDL	500	ug/L
BROMOFORM	BDL	500	ug/L
BROMOMETHANE	BDL	1000	ug/L
CARBON DISULFIDE	BDL	500	ug/L
CARBON TETRACHLORIDE	BDL	500	ug/L
CHLOROBENZENE	BDL	500	ug/L
CHLOROETHANE	BDL	1000	ug/L
CHLOROFORM	BDL	500	ug/L
CHLOROMETHANE	BDL	1000	ug/L
DIBROMOCHLOROMETHANE	BDL	500	ug/L
CIS-1,3-DICHLOROPROPENE	BDL	500	ug/L
1,1-DICHLOROETHANE	BDL	500	ug/L
1,2-DICHLOROETHANE	BDL	500	ug/L
1,1-DICHLOROETHENE	BDL	500	ug/L
1,2-DICHLOROPROPANE	BDL	500	ug/L
ETHYL BENZENE	BDL	500	ug/L
2-HEXANONE	BDL	1000	ug/L
DICHLOROMETHANE (METHYLENE CHLORIDE)	BDL	500	ug/L
METHYL ETHYL KETONE	BDL	1000	ug/L
4-METHYL-2-PENTANONE	BDL	1000	ug/L
STYRENE	BDL	500	ug/L
1,1,2,2-TETRACHLOROETHANE	BDL	500	ug/L
TETRACHLOROETHENE	BDL	500	ug/L
TOLUENE	BDL	500	ug/L
1,2-DICHLOROETHENE (CIS AND TRANS)	13000	500	ug/L
TRANS-1,3-DICHLOROPROPENE	BDL	500	ug/L
1,1,1-TRICHLOROETHANE	BDL	500	ug/L
1,1,2-TRICHLOROETHANE	BDL	500	ug/L
TRICHLOROETHENE	BDL	500	ug/L
VINYL ACETATE	BDL	1000	ug/L
VINYL CHLORIDE	1000	1000	ug/L
XYLENES (O/M/P-XYLENE)	BDL	500	ug/L
... SURROGATE RECOVERY			
-----			
DICHLOROETHANE-D4	105		% Rec
TOLUENE-D8	95		% Rec
4-BROMOFLUOROBENZENE	106		% Rec
1:100 dilution.			

## FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A

Analyst: E. MERRILL

Analysis Date: 02-DEC-93

Test: P130.4.0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	50		mL
FINAL VOLUME	50		mL

## ALUMINUM ICP SW846-6010A

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M101.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
ALUMINUM	BDL	0.050	mg/L

## ANTIMONY ICP SW846-6010A

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M102.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
ANTIMONY	BDL	0.030	mg/L

## BARIUM ICP SW846-6010A

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M104.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
BARIUM	0.069	0.010	mg/L

## BERYLLIUM ICP SW846-6010A

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M105.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
BERYLLIUM	BDL	0.0050	mg/L

## BORON ICP SW846-6010A

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M107.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
BORON	4.1	0.050	mg/L

## CALCIUM ICP SW846-6010A

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M109.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
CALCIUM	100	0.20	mg/L

## CHROMIUM ICP SW846-6010A

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M110.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
CHROMIUM	BDL	0.010	mg/L

## COBALT ICP SW846-6010A

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M111.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
COBALT	BDL	0.010	mg/L

**COPPER ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M112.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
COPPER	BDL	0.020	mg/L

**IRON ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M115.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
IRON	BDL	0.025	mg/L

**MAGNESIUM ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M118.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
MAGNESIUM	45.	0.20	mg/L

**MANGANESE ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M119.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
MANGANESE	0.019	0.010	mg/L

**NICKEL ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M122.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
NICKEL	BDL	0.010	mg/L

**POTASSIUM ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M126.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
POTASSIUM	4.7	0.20	mg/L

**SILVER ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M130.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
SILVER	BDL	0.010	mg/L

**SODIUM ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M131.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
SODIUM	73.	0.20	mg/L

**VANADIUM ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M138.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
VANADIUM	BDL	0.010	mg/L

**ZINC ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M139.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
ZINC	BDL	0.020	mg/L

**GFAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-3020A**

Analyst: R. BYERS

Analysis Date: 07-DEC-93

Test: P130.6.0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	50		mL
FINAL VOLUME	50		mL

**ARSENIC GFAA SW846-7060**

Analyst: N. HEMMERLEIN

Analysis Date: 20-DEC-93

Instrument: GFAA

Test: M103.2.0

Prep: GFAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-3020A P130.6.0

Parameter	Result	Det. Limit	Units
ARSENIC	BDL	0.0050	mg/L

**CADMIUM TRACE ICP SW846-6010A**

Analyst: J. WALLACE

Analysis Date: 21-DEC-93

Instrument: ICP

Test: M106.0.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
CADMIUM	BDL	0.0010	mg/L

**LEAD TRACE ICP SW846-6010A**

Analyst: J. WALLACE

Analysis Date: 21-DEC-93

Instrument: ICP

Test: M116.0.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
LEAD	BDL	0.0050	mg/L

**THALLIUM GFAA SW846-7841**

Analyst: A. ROBERTSON

Analysis Date: 12-DEC-93

Instrument: GFAA

Test: M134.2.0

Prep: GFAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-3020A P130.6.0

Parameter	Result	Det. Limit	Units
THALLIUM	BDL	0.020	mg/L

1:4 DILUTION

**SELENIUM GFAA SW846-7740**

Analyst: A. ROBERTSON

Analysis Date: 20-DEC-93

Instrument: GFAA

Test: M128.2.0

Prep: GFAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-3020A P130.6.0

Parameter	Result	Det. Limit	Units
SELENIUM	BDL	0.0050	mg/L

**MERCURY CVAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-7470**

Analyst: G. MAPP

Analysis Date: 01-DEC-93

Test: P131.6.0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	100		mL
FINAL VOLUME	100		mL

**MERCURY CVAA SW846-7470**

Analyst: G. MAPP

Analysis Date: 07-DEC-93

Instrument: CVAA

Test: M120.1.0

Prep: MERCURY CVAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-7470 P131.6.0

Parameter	Result	Det. Limit	Units
MERCURY	BDL	0.00050	mg/L

Sample Comments

BDL Below Detection Limit  
EST Estimated Value

IDEM Drinking Water Certification Number C-49-01  
This Certificate shall not be reproduced, except in full,  
without the written approval of the lab.

*CB Boyle*

# C E R T I F I C A T E   O F   A N A L Y S I S

<b>Service Location</b> HERITAGE LABORATORIES, INC. 7901 W. MORRIS ST. INDIANAPOLIS, IN 46231 (317)243-8305	<b>Received</b> 30-NOV-93	<b>Project</b>	<b>Lab ID</b> A297727
	<b>Complete</b> 22-DEC-93	<b>PO Number</b> CI0325.001	
	<b>Printed</b> 23-DEC-93	<b>Sampled</b> 29-NOV-93 08:55	

<b>Report To</b>  GARY CIPRIANO GERAGHTY & MILLER, INC., SUITE 1000 35 E. WACKER DRIVE CHICAGO, IL 60601	<b>Bill To</b>  GARY CIPRIANO GERAGHTY & MILLER, INC., 35 E. WACKER DRIVE CHICAGO, IL 60601
<b>Sample Description</b>  DESCRIPTION: GMMW-1 LOCATION: STACK PROPERTY - NORTH CHICAGO	

## VOLATILE ORGANICS SW846-8240A

Analyst: G. WILSON

Analysis Date: 09-DEC-93 12:44 Instrument: GC/MS VOA

Test: 0510.3.0

Parameter	Result	Det. Limit	Units
ACETONE	BDL	20	ug/L
BENZENE	BDL	5	ug/L
BROMODICHLOROMETHANE	BDL	5	ug/L
BROMOFORM	BDL	5	ug/L
BROMOMETHANE	BDL	10	ug/L
CARBON DISULFIDE	BDL	5	ug/L
CARBON TETRACHLORIDE	BDL	5	ug/L
CHLOROBENZENE	BDL	5	ug/L
CHLOROETHANE	BDL	10	ug/L
CHLOROFORM	BDL	5	ug/L
CHLOROMETHANE	BDL	10	ug/L
DIBROMOCHLOROMETHANE	BDL	5	ug/L
CIS-1,3-DICHLOROPROPENE	BDL	5	ug/L
1,1-DICHLOROETHANE	BDL	5	ug/L
1,2-DICHLOROETHANE	BDL	5	ug/L
1,1-DICHLOROETHENE	BDL	5	ug/L
1,2-DICHLOROPROPANE	BDL	5	ug/L
ETHYL BENZENE	BDL	5	ug/L
2-HEXANONE	BDL	10	ug/L
DICHLOROMETHANE (METHYLENE CHLORIDE)	BDL	5	ug/L
METHYL ETHYL KETONE	BDL	10	ug/L
4-METHYL-2-PENTANONE	BDL	10	ug/L
STYRENE	BDL	5	ug/L
1,1,2,2-TETRACHLOROETHANE	BDL	5	ug/L
TETRACHLOROETHENE	BDL	5	ug/L
TOLUENE	BDL	5	ug/L
1,2-DICHLOROETHENE (CIS AND TRANS)	BDL	5	ug/L
TRANS-1,3-DICHLOROPROPENE	BDL	5	ug/L
1,1,1-TRICHLOROETHANE	BDL	5	ug/L
1,1,2-TRICHLOROETHANE	BDL	5	ug/L
TRICHLOROETHENE	BDL	5	ug/L
VINYL ACETATE	BDL	10	ug/L
VINYL CHLORIDE	BDL	10	ug/L
XYLENES (O/M/P-XYLENE)	BDL	5	ug/L

Parameter	Result	Det. Limit	Units
.... SURROGATE RECOVERY -----			
DICHLOROETHANE-D4	107		% Rec
TOLUENE-D8	99		% Rec
4-BROMOFLUOROBENZENE	112		% Rec

## FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A

Analyst: E. MERRILL

Analysis Date: 02-DEC-93

Test: P130.4.0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	50		mL
FINAL VOLUME	50		mL

## ALUMINUM ICP SW846-6010A

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M101.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
ALUMINUM	BDL	0.050	mg/L

## ANTIMONY ICP SW846-6010A

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M102.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
ANTIMONY	BDL	0.030	mg/L

## BARIUM ICP SW846-6010A

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M104.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
BARIUM	0.032	0.010	mg/L

## BERYLLIUM ICP SW846-6010A

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M105.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
BERYLLIUM	BDL	0.0050	mg/L

## BORON ICP SW846-6010A

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M107.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
BORON	0.30	0.050	mg/L

## CALCIUM ICP SW846-6010A

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M109.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
CALCIUM	150	0.20	mg/L

## CHROMIUM ICP SW846-6010A

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M110.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
CHROMIUM	BDL	0.010	mg/L

**COBALT ICP SW846-6010A**

Analyst: M. JAO Analysis Date: 06-DEC-93 08:00 Instrument: ICP  
 Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Test: M112.3.0

Parameter	Result	Det. Limit	Units
COBALT	BDL	0.010	mg/L

**COPPER ICP SW846-6010A**

Analyst: M. JAO Analysis Date: 06-DEC-93 08:00 Instrument: ICP  
 Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Test: M112.3.0

Parameter	Result	Det. Limit	Units
COPPER	BDL	0.020	mg/L

**IRON ICP SW846-6010A**

Analyst: M. JAO Analysis Date: 06-DEC-93 08:00 Instrument: ICP  
 Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Test: M112.3.0

Parameter	Result	Det. Limit	Units
IRON	0.49	0.025	mg/L

**MAGNESIUM ICP SW846-6010A**

Analyst: M. JAO Analysis Date: 06-DEC-93 08:00 Instrument: ICP  
 Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Test: M112.3.0

Parameter	Result	Det. Limit	Units
MAGNESIUM	76.	0.20	mg/L

**MANGANESE ICP SW846-6010A**

Analyst: M. JAO Analysis Date: 06-DEC-93 08:00 Instrument: ICP  
 Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Test: M112.3.0

Parameter	Result	Det. Limit	Units
MANGANESE	0.065	0.010	mg/L

**NICKEL ICP SW846-6010A**

Analyst: M. JAO Analysis Date: 06-DEC-93 08:00 Instrument: ICP  
 Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Test: M122.3.0

Parameter	Result	Det. Limit	Units
NICKEL	BDL	0.010	mg/L

**POTASSIUM ICP SW846-6010A**

Analyst: M. JAO Analysis Date: 06-DEC-93 08:00 Instrument: ICP  
 Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Test: M126.3.0

Parameter	Result	Det. Limit	Units
POTASSIUM	3.3	0.20	mg/L

**SILVER ICP SW846-6010A**

Analyst: M. JAO Analysis Date: 06-DEC-93 08:00 Instrument: ICP  
 Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Test: M138.3.0

Parameter	Result	Det. Limit	Units
SILVER	BDL	0.010	mg/L

**SODIUM ICP SW846-6010A**

Analyst: M. JAO Analysis Date: 06-DEC-93 08:00 Instrument: ICP  
 Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Test: M137.3.0

Parameter	Result	Det. Limit	Units
SODIUM	19.	0.20	mg/L



**VANADIUM ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M138.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
VANADIUM	BDL	0.010	mg/L

**ZINC ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M139.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
ZINC	0.021	0.020	mg/L

**GFAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-3020A**

Analyst: R. BYERS

Analysis Date: 07-DEC-93

Test: P130.6.0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	50		mL
FINAL VOLUME	50		mL

**ARSENIC GFAA SW846-7060**

Analyst: W. HEMMERLEIN

Analysis Date: 20-DEC-93

Instrument: GFAA

Test: M103.2.0

Prep: GFAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-3020A P130.6.0

Parameter	Result	Det. Limit	Units
ARSENIC	BDL	0.0050	mg/L

**CADMIUM TRACE ICP SW846-6010A**

Analyst: J. WALLACE

Analysis Date: 21-DEC-93

Instrument: ICP

Test: M108.0.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
CADMIUM	BDL	0.0010	mg/L

**LEAD TRACE ICP SW846-6010A**

Analyst: J. WALLACE

Analysis Date: 21-DEC-93

Instrument: ICP

Test: M116.0.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
LEAD	BDL	0.0050	mg/L

**THALLIUM GFAA SW846-7841**

Analyst: A. ROBERTSON

Analysis Date: 12-DEC-93

Instrument: GFAA

Test: M134.2.0

Prep: GFAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-3020A P130.6.0

Parameter	Result	Det. Limit	Units
THALLIUM	BDL	0.020	mg/L

1:4 DILUTION

**SELENIUM GFAA SW846-7740**

Analyst: A. ROBERTSON

Analysis Date: 20-DEC-93

Instrument: GFAA

Test: M128.2.0

Prep: GFAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-3020A P130.6.0

Parameter	Result	Det. Limit	Units
SELENIUM	BDL	0.0050	mg/L

**MERCURY CVAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-7470**

Analyst: G. MAPP

Analysis Date: 01-DEC-93

Test: P131.6.0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	100		mL
FINAL VOLUME	100		mL

## MERCURY CVAA SW846-7470

Analyst: G. MAPP

Analysis Date: 07-DEC-93

Instrument: CVAA

Test: M120.1.0...

Prep: MERCURY CVAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-7470 P131.6.0

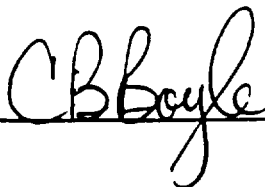
Parameter	Result	Det. Limit	Units
MERCURY	BDL	0.00050	mg/L

## Sample Comments

BDL Below Detection Limit

IDEM Drinking Water Certification Number C-49-01

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# CERTIFICATE OF ANALYSIS

<b>Service Location</b> HERITAGE LABORATORIES, INC. 7901 W. MORRIS ST. INDIANAPOLIS, IN 46231 (317)243-8305	<b>Received</b>	<b>Project</b>	<b>Lab ID</b>
	30-NOV-93		A297729
	<b>Complete</b>	<b>PO Number</b>	
	22-DEC-93	CI0325.001	
	<b>Printed</b>	<b>Sampled</b>	
	23-DEC-93	29-NOV-93 09:40	

<b>Report To</b>	<b>Bill To</b>
GARY CIPRIANO GERAGHTY & MILLER, INC., SUITE 1000 35 E. WACKER DRIVE CHICAGO, IL 60601	GARY CIPRIANO GERAGHTY & MILLER, INC., 35 E. WACKER DRIVE CHICAGO, IL 60601
<b>Sample Description</b> DESCRIPTION: GMMW-2 LOCATION: STACK PROPERTY - NORTH CHICAGO	

## VOLATILE ORGANICS SW846-8240A

Analyst: G. WILSON

Analysis Date: 08-DEC-93 16:06 Instrument: GC/MS VOA

Test: 0510.3.0

Parameter	Result	Det. Limit	Units
ACETONE	BDL	20	ug/L
BENZENE	BDL	5	ug/L
BROMODICHLOROMETHANE	BDL	5	ug/L
BROMOFORM	BDL	5	ug/L
BROMOMETHANE	BDL	10	ug/L
CARBON DISULFIDE	BDL	5	ug/L
CARBON TETRACHLORIDE	BDL	5	ug/L
CHLOROBENZENE	BDL	5	ug/L
CHLOROETHANE	BDL	10	ug/L
CHLOROFORM	BDL	5	ug/L
CHLOROMETHANE	BDL	10	ug/L
DIBROMOCHLOROMETHANE	BDL	5	ug/L
CIS-1,3-DICHLOROPROPENE	BDL	5	ug/L
1,1-DICHLOROETHANE	BDL	5	ug/L
1,2-DICHLOROETHANE	BDL	5	ug/L
1,1-DICHLOROETHENE	BDL	5	ug/L
1,2-DICHLOROPROPANE	BDL	5	ug/L
ETHYL BENZENE	BDL	5	ug/L
2-HEXANONE	BDL	10	ug/L
DICHLOROMETHANE (METHYLENE CHLORIDE)	BDL	5	ug/L
METHYL ETHYL KETONE	BDL	10	ug/L
4-METHYL-2-PENTANONE	BDL	10	ug/L
STYRENE	BDL	5	ug/L
1,1,2,2-TETRACHLOROETHANE	BDL	5	ug/L
TETRACHLOROETHENE	BDL	5	ug/L
TOLUENE	BDL	5	ug/L
1,2-DICHLOROETHENE (CIS AND TRANS)	23	5	ug/L
TRANS-1,3-DICHLOROPROPENE	BDL	5	ug/L
1,1,1-TRICHLOROETHANE	BDL	5	ug/L
1,1,2-TRICHLOROETHANE	BDL	5	ug/L
TRICHLOROETHENE	BDL	5	ug/L
VINYL ACETATE	BDL	10	ug/L
VINYL CHLORIDE	BDL	10	ug/L
XYLENES (O/M/P-XYLENE)	BDL	5	ug/L

Parameter	Result	Det. Limit	Units
SURROGATE RECOVERY			
DICHLOROETHANE-D4	99		% Rec
TOLUENE-D8	98		% Rec
4-BROMOFLUOROBENZENE	103		% Rec

**FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A**

Analyst: E. MERRILL

Analysis Date: 02-DEC-93

Test: P130.4.0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	50		mL
FINAL VOLUME	50		mL

**ALUMINUM ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M101.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
ALUMINUM	BDL	0.050	mg/L

**ANTIMONY ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M102.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
ANTIMONY	BDL	0.030	mg/L

**BARIUM ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M104.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
BARIUM	0.12	0.010	mg/L

**BERYLLIUM ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M105.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
BERYLLIUM	BDL	0.0050	mg/L

**BORON ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M107.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
BORON	1.5	0.050	mg/L

**CALCIUM ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M109.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
CALCIUM	130	0.20	mg/L

**CHROMIUM ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M110.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
CHROMIUM	BDL	0.010	mg/L

**COBALT ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M111.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
COBALT	BDL	0.010	mg/L

**COPPER ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M112.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
COPPER	BDL	0.020	mg/L

**IRON ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M115.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
IRON	1.3	0.025	mg/L

**MAGNESIUM ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M118.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
MAGNESIUM	50.	0.20	mg/L

**MANGANESE ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M119.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
MANGANESE	0.25	0.010	mg/L

**NICKEL ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M122.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
NICKEL	BDL	0.010	mg/L

**POTASSIUM ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M126.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
POTASSIUM	18.	0.20	mg/L

**SILVER ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M130.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
SILVER	BDL	0.010	mg/L

**SODIUM ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M131.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
SODIUM	71.	0.20	mg/L

**VANADIUM ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M138.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
VANADIUM	BDL	0.010	mg/L

**ZINC ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M139.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
ZINC	0.046	0.020	mg/L

**GFAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-3020A**

Analyst: R. BYERS

Analysis Date: 07-DEC-93

Test: P130.6.0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	50		mL
FINAL VOLUME	50		mL

**ARSENIC GFAA SW846-7060**

Analyst: M. HEMMERLEIN

Analysis Date: 20-DEC-93

Instrument: GFAA

Test: M103.2.0

Prep: GFAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-3020A P130.6.0

Parameter	Result	Det. Limit	Units
ARSENIC	BDL	0.0050	mg/L

**CADMIUM TRACE ICP SW846-6010A**

Analyst: J. WALLACE

Analysis Date: 21-DEC-93

Instrument: ICP

Test: M108.0.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
CADMIUM	BDL	0.0010	mg/L

**LEAD TRACE ICP SW846-6010A**

Analyst: J. WALLACE

Analysis Date: 21-DEC-93

Instrument: ICP

Test: M116.0.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
LEAD	BDL	0.0050	mg/L

**THALLIUM GFAA SW846-7841**

Analyst: A. ROBERTSON

Analysis Date: 12-DEC-93

Instrument: GFAA

Test: M134.2.0

Prep: GFAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-3020A P130.6.0

Parameter	Result	Det. Limit	Units
THALLIUM	BDL	0.010	mg/L

1:2 DILUTION

**SELENIUM GFAA SW846-7740**

Analyst: A. ROBERTSON

Analysis Date: 20-DEC-93

Instrument: GFAA

Test: M128.2.0

Prep: GFAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-3020A P130.6.0

Parameter	Result	Det. Limit	Units
SELENIUM	BDL	0.0050	mg/L

**MERCURY CVAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-7470**

Analyst: G. NAPP

Analysis Date: 01-DEC-93

Test: P131.6.0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	100		mL
FINAL VOLUME	100		mL

**MERCURY CVAA SW846-7470**

Analyst: G. MAPP

Analysis Date: 07-DEC-93

Instrument: CVAA

Test: M120.1.0

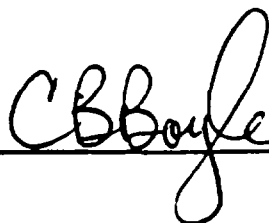
Prep: MERCURY CVAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-7470 P131.6.0

Parameter	Result	Det. Limit	Units
MERCURY	BDL	0.00050	mg/L

## Sample Comments

*BDL Below Detection Limit**IDEM Drinking Water Certification Number C-49-01**This Certificate shall not be reproduced, except in full,  
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Quality Assurance Officer: \_\_\_\_\_



# C E R T I F I C A T E   O F   A N A L Y S I S

Service Location HERITAGE LABORATORIES, INC. 7901 W. MORRIS ST. INDIANAPOLIS, IN 46231 (317)243-8305	Received	Project	Lab ID
	30-NOV-93		A297723
	Complete	PO Number	
	22-DEC-93	CI0325.001	
	Printed	Sampled	
	23-DEC-93	29-NOV-93 14:40	

Report To	Bill To
GARY CIPRIANO GERAGHTY & MILLER, INC., SUITE 1000 35 E. WACKER DRIVE CHICAGO, IL 60601	GARY CIPRIANO GERAGHTY & MILLER, INC., 35 E. WACKER DRIVE CHICAGO, IL 60601
Sample Description	
DESCRIPTION: GMMW-3 LOCATION: STACK PROPERTY - NORTH CHICAGO	

## VOLATILE ORGANICS SW846-8240A

Analyst: G. WILSON

Analysis Date: 08-DEC-93 11:16 Instrument: GC/MS VOA

Test: 0510.3.0

Parameter	Result	Det. Limit	Units
ACETONE	BDL	20	ug/L
BENZENE	BDL	5	ug/L
BROMODICHLOROMETHANE	BDL	5	ug/L
BROMOFORM	BDL	5	ug/L
BROMOMETHANE	BDL	10	ug/L
CARBON DISULFIDE	BDL	5	ug/L
CARBON TETRACHLORIDE	BDL	5	ug/L
CHLOROBENZENE	BDL	5	ug/L
CHLOROETHANE	BDL	10	ug/L
CHLOROFORM	BDL	5	ug/L
CHLOROMETHANE	BDL	10	ug/L
DIBROMOCHLOROMETHANE	BDL	5	ug/L
CIS-1,3-DICHLOROPROPENE	BDL	5	ug/L
1,1-DICHLOROETHANE	BDL	5	ug/L
1,2-DICHLOROETHANE	BDL	5	ug/L
1,1-DICHLOROETHENE	BDL	5	ug/L
1,2-DICHLOROPROPANE	BDL	5	ug/L
ETHYL BENZENE	BDL	5	ug/L
2-HEXANONE	BDL	10	ug/L
DICHLOROMETHANE (METHYLENE CHLORIDE)	BDL	5	ug/L
METHYL ETHYL KETONE	BDL	10	ug/L
4-METHYL-2-PENTANONE	BDL	10	ug/L
STYRENE	BDL	5	ug/L
1,1,2,2-TETRACHLOROETHANE	BDL	5	ug/L
TETRACHLOROETHENE	BDL	5	ug/L
TOLUENE	BDL	5	ug/L
1,2-DICHLOROETHENE (CIS AND TRANS)	17	5	ug/L
TRANS-1,3-DICHLOROPROPENE	BDL	5	ug/L
1,1,1-TRICHLOROETHANE	BDL	5	ug/L
1,1,2-TRICHLOROETHANE	BDL	5	ug/L
TRICHLOROETHENE	BDL	5	ug/L
VINYL ACETATE	BDL	10	ug/L
VINYL CHLORIDE	13	10	ug/L
XYLENES (O/M/P-XYLENE)	BDL	5	ug/L



Parameter	Result	Det. Limit	Units
SURROGATE RECOVERY			
DICHLOROETHANE-D4	100		% Rec
TOLUENE-D8	96		% Rec
4-BROMOFLUOROBENZENE	101		% Rec

## FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A

Analyst: E. MERRILL

Analysis Date: 02-DEC-93

Test: P130.4.0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	50		mL
FINAL VOLUME	50		mL

## ALUMINUM ICP SW846-6010A

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M101.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
ALUMINUM	BDL	0.050	mg/L

## ANTIMONY ICP SW846-6010A

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M102.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
ANTIMONY	BDL	0.030	mg/L

## BARIUM ICP SW846-6010A

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M104.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
BARIUM	0.15	0.010	mg/L

## BERYLLIUM ICP SW846-6010A

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M105.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
BERYLLIUM	BDL	0.0050	mg/L

## BORON ICP SW846-6010A

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M107.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
BORON	1.6	0.050	mg/L

## CALCIUM ICP SW846-6010A

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M109.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
CALCIUM	160	0.20	mg/L

## CHROMIUM ICP SW846-6010A

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M110.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
CHROMIUM	BDL	0.010	mg/L

**COBALT ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M113.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
COBALT	BDL	0.010	mg/L

**COPPER ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M112.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
COPPER	BDL	0.020	mg/L

**IRON ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M115.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
IRON	3.5	0.025	mg/L

**MAGNESIUM ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M118.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
MAGNESIUM	81.	0.20	mg/L

**MANGANESE ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M119.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
MANGANESE	0.43	0.010	mg/L

**NICKEL ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M122.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
NICKEL	BDL	0.010	mg/L

**POTASSIUM ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M126.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
POTASSIUM	3.2	0.20	mg/L

**SILVER ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M130.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
SILVER	BDL	0.010	mg/L

**SODIUM ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M131.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
SODIUM	62.	0.20	mg/L

**VANADIUM ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M138.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
VANADIUM	BDL	0.010	mg/L

**ZINC ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M139.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
ZINC	BDL	0.020	mg/L

**GFAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-3020A**

Analyst: R. BYERS

Analysis Date: 07-DEC-93

Test: P130.6.0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	50		mL
FINAL VOLUME	50		mL

**ARSENIC GFAA SW846-7060**

Analyst: M. HEMMERLEIN

Analysis Date: 20-DEC-93

Instrument: GFAA

Test: M103.2.0

Prep: GFAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-3020A P130.6.0

Parameter	Result	Det. Limit	Units
ARSENIC	0.10	0.025	mg/L

1:5 dilution

**CADMIUM TRACE ICP SW846-6010A**

Analyst: J. WALLACE

Analysis Date: 21-DEC-93

Instrument: ICP

Test: M108.0.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
CADMIUM	BDL	0.0010	mg/L

**LEAD TRACE ICP SW846-6010A**

Analyst: J. WALLACE

Analysis Date: 21-DEC-93

Instrument: ICP

Test: M116.0.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
LEAD	BDL	0.0050	mg/L

**THALLIUM GFAA SW846-7841**

Analyst: A. ROBERTSON

Analysis Date: 12-DEC-93

Instrument: GFAA

Test: M134.2.0

Prep: GFAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-3020A P130.6.0

Parameter	Result	Det. Limit	Units
THALLIUM	BDL	0.020	mg/L

1:4 DILUTION

**SELENIUM GFAA SW846-7740**

Analyst: A. ROBERTSON

Analysis Date: 20-DEC-93

Instrument: GFAA

Test: M128.2.0

Prep: GFAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-3020A P130.6.0

Parameter	Result	Det. Limit	Units
SELENIUM	BDL	0.0050	mg/L

**MERCURY CVAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-7470**

Analyst: G. MAPP

Analysis Date: 01-DEC-93

Test: P131.6.0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	100		mL
FINAL VOLUME	100		mL

**MERCURY CVAA SW846-7470**

Analyst: G. MAPP

Analysis Date: 07-DEC-93

Instrument: CVAA

Test: M120.3.0

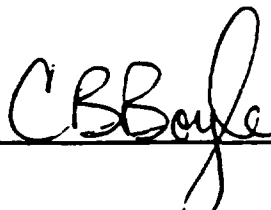
Prep: MERCURY CVAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-7470 P131.6.0

Parameter	Result	Det. Limit	Units
MERCURY	BDL	0.00050	mg/L

## Sample Comments

*BDL Below Detection Limit*

*IDEM Drinking Water Certification Number C-49-01  
This Certificate shall not be reproduced, except in full,  
without the written approval of the lab.*



# C E R T I F I C A T E   O F   A N A L Y S I S

Service Location HERITAGE LABORATORIES, INC. 7901 W. MORRIS ST. INDIANAPOLIS, IN 46231 (317)243-8305	Received 30-NOV-93	Project	Lab ID A297728
	Complete 22-DEC-93	PO Number CI0325.001	
	Printed 23-DEC-93	Sampled 29-NOV-93 11:20	

Report To  GARY CIPRIANO GERAGHTY & MILLER, INC., SUITE 1000 35 E. WACKER DRIVE CHICAGO, IL 60601	Bill To  GARY CIPRIANO GERAGHTY & MILLER, INC., 35 E. WACKER DRIVE CHICAGO, IL 60601
Sample Description  DESCRIPTION: RINSE BLANK LOCATION: STACK PROPERTY - NORTH CHICAGO	

## VOLATILE ORGANICS SW846-8240A

Analyst: G. WILSON

Analysis Date: 08-DEC-93 15:18 Instrument: GC/MS VOA

Test: 0510.3.0

Parameter	Result	Det. Limit	Units
ACETONE	BDL	20	ug/L
BENZENE	BDL	5	ug/L
BROMODICHLOROMETHANE	BDL	5	ug/L
BROMOFORM	BDL	5	ug/L
BROMOMETHANE	BDL	10	ug/L
CARBON DISULFIDE	BDL	5	ug/L
CARBON TETRACHLORIDE	BDL	5	ug/L
CHLOROBENZENE	BDL	5	ug/L
CHLOROETHANE	BDL	10	ug/L
CHLOROFORM	BDL	5	ug/L
CHLOROMETHANE	BDL	10	ug/L
DIBROMOCHLOROMETHANE	BDL	5	ug/L
CIS-1,3-DICHLOROPROPENE	BDL	5	ug/L
1,1-DICHLOROETHANE	BDL	5	ug/L
1,2-DICHLOROETHANE	BDL	5	ug/L
1,1-DICHLOROETHENE	BDL	5	ug/L
1,2-DICHLOROPROPANE	BDL	5	ug/L
ETHYL BENZENE	BDL	5	ug/L
2-HEXANONE	BDL	10	ug/L
DICHLOROMETHANE (METHYLENE CHLORIDE)	BDL	5	ug/L
METHYL ETHYL KETONE	BDL	10	ug/L
4-METHYL-2-PENTANONE	BDL	10	ug/L
STYRENE	BDL	5	ug/L
1,1,2,2-TETRACHLOROETHANE	BDL	5	ug/L
TETRACHLOROETHENE	BDL	5	ug/L
TOLUENE	BDL	5	ug/L
1,2-DICHLOROETHENE (CIS AND TRANS)	BDL	5	ug/L
TRANS-1,3-DICHLOROPROPENE	BDL	5	ug/L
1,1,1-TRICHLOROETHANE	BDL	5	ug/L
1,1,2-TRICHLOROETHANE	BDL	5	ug/L
TRICHLOROETHENE	BDL	5	ug/L
VINYL ACETATE	BDL	10	ug/L
VINYL CHLORIDE	BDL	10	ug/L
XYLENES (O/M/P-XYLENE)	BDL	5	ug/L

Parameter	Result	Det. Limit	Units
SURROGATE RECOVERY			
DICHLOROETHANE-D4	106		% Rec
TOLUENE-D8	99		% Rec
4-BROMOFLUOROBENZENE	107		% Rec

## FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A

Analyst: E. MERRILL

Analysis Date: 02-DEC-93

Test: P130.4.0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	50		mL
FINAL VOLUME	50		mL

## ALUMINUM ICP SW846-6010A

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M101.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
ALUMINUM	BDL	0.050	mg/L

## ANTIMONY ICP SW846-6010A

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M102.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
ANTIMONY	BDL	0.030	mg/L

## BARIUM ICP SW846-6010A

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M104.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
BARIUM	BDL	0.010	mg/L

## BERYLLIUM ICP SW846-6010A

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M105.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
BERYLLIUM	BDL	0.0050	mg/L

## BORON ICP SW846-6010A

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M107.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
BORON	0.084	0.050	mg/L

## CALCIUM ICP SW846-6010A

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M109.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
CALCIUM	BDL	0.20	mg/L

## CHROMIUM ICP SW846-6010A

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M110.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
CHROMIUM	BDL	0.010	mg/L

**COBALT ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: N119.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
COBALT	BDL	0.010	mg/L

**COPPER ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: N112.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
COPPER	BDL	0.020	mg/L

**IRON ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: N119.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
IRON	BDL	0.025	mg/L

**MAGNESIUM ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: N118.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
MAGNESIUM	BDL	0.20	mg/L

**MANGANESE ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: N119.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
MANGANESE	BDL	0.010	mg/L

**NICKEL ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: N122.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
NICKEL	BDL	0.010	mg/L

**POTASSIUM ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: N126.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
POTASSIUM	BDL	0.20	mg/L

**SILVER ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: N130.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
SILVER	BDL	0.010	mg/L

**SODIUM ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: N131.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
SODIUM	BDL	0.20	mg/L

**VANADIUM ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: N138.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
VANADIUM	BDL	0.010	mg/L

**ZINC ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: N139.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
ZINC	BDL	0.020	mg/L

**GFAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-3020A**

Analyst: R. BYERS

Analysis Date: 07-DEC-93

Test: P130.6.0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	50		ml
FINAL VOLUME	50		ml

**ARSENIC GFAA SW846-7060**

Analyst: M. HEMMERLEIN

Analysis Date: 20-DEC-93 Instrument: GFAA

Test: N103.2.0

Prep: GFAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-3020A P130.6.0

Parameter	Result	Det. Limit	Units
ARSENIC	BDL	0.0050	mg/L

**CADMIUM TRACE ICP SW846-6010A**

Analyst: J. WALLACE

Analysis Date: 21-DEC-93 Instrument: ICP

Test: N106.8.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
CADMIUM	BDL	0.0010	mg/L

**LEAD TRACE ICP SW846-6010A**

Analyst: J. WALLACE

Analysis Date: 21-DEC-93 Instrument: ICP

Test: N116.0.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
LEAD	BDL	0.0050	mg/L

**THALLIUM GFAA SW846-7841**

Analyst: A. ROBERTSON

Analysis Date: 12-DEC-93 Instrument: GFAA

Test: N134.2.0

Prep: GFAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-3020A P130.6.0

Parameter	Result	Det. Limit	Units
THALLIUM	BDL	0.020	mg/L

1:4 DILUTION

**SELENIUM GFAA SW846-7740**

Analyst: A. ROBERTSON

Analysis Date: 20-DEC-93 Instrument: GFAA

Test: N128.2.0

Prep: GFAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-3020A P130.6.0

Parameter	Result	Det. Limit	Units
SELENIUM	BDL	0.0050	mg/L

**MERCURY CVAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-7470**

Analyst: G. NAPP

Analysis Date: 01-DEC-93

Test: P131.5.0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	100		ml
FINAL VOLUME	100		ml



**MERCURY CVAA SW846-7470**

Analyst: G. MAPP

Analysis Date: 07-DEC-93

Instrument: CVAA

Test: M120.1.0

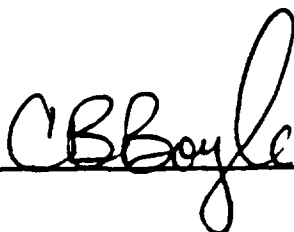
Prep: MERCURY CVAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-7470 P131.6.0

Parameter	Result	Det. Limit	Units
MERCURY	BDL	0.00050	mg/L

## Sample Comments

BDL Below Detection Limit

IDEM Drinking Water Certification Number C-49-01

This Certificate shall not be reproduced, except in full,  
without the written approval of the lab.

# CERTIFICATE OF ANALYSIS

<b>Service Location</b> HERITAGE LABORATORIES, INC. 7901 W. MORRIS ST. INDIANAPOLIS, IN 46231 (317)243-8305	<b>Received</b> 30-NOV-93	<b>Project</b>	<b>Lab ID</b> A297724
	<b>Complete</b> 22-DEC-93	<b>PO Number</b> C10325.001	
	<b>Printed</b> 23-DEC-93	<b>Sampled</b> 29-NOV-93 07:30	

<b>Report To</b>  GARY CIPRIANO GERAGHTY & MILLER, INC., SUITE 1000 35 E. WACKER DRIVE CHICAGO, IL 60601	<b>Bill To</b>  GARY CIPRIANO GERAGHTY & MILLER, INC., 35 E. WACKER DRIVE CHICAGO, IL 60601
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<b>Sample Description</b>  DESCRIPTION: GMMW-4 LOCATION: STACK PROPERTY - NORTH CHICAGO
--

## VOLATILE ORGANICS SW846-8240A

Analyst: G. WILSON

Analysis Date: 08-DEC-93 12:04 Instrument: GC/MS VOA

Test: 0510.3.0

Parameter	Result	Det. Limit	Units
ACETONE	BDL	20	ug/L
BENZENE	BDL	5	ug/L
BROMODICHLOROMETHANE	BDL	5	ug/L
BROMOFORM	BDL	5	ug/L
BROMOMETHANE	BDL	10	ug/L
CARBON DISULFIDE	BDL	5	ug/L
CARBON TETRACHLORIDE	BDL	5	ug/L
CHLOROBENZENE	BDL	5	ug/L
CHLOROETHANE	BDL	10	ug/L
CHLOROFORM	BDL	5	ug/L
CHLOROMETHANE	BDL	10	ug/L
DIBROMOCHLOROMETHANE	BDL	5	ug/L
CIS-1,3-DICHLOROPROPENE	BDL	5	ug/L
1,1-DICHLOROETHANE	BDL	5	ug/L
1,2-DICHLOROETHANE	BDL	5	ug/L
1,1-DICHLOROETHENE	BDL	5	ug/L
1,2-DICHLOROPROPANE	BDL	5	ug/L
ETHYL BENZENE	BDL	5	ug/L
2-HEXANONE	BDL	10	ug/L
DICHLOROMETHANE (METHYLENE CHLORIDE)	BDL	5	ug/L
METHYL ETHYL KETONE	BDL	10	ug/L
4-METHYL-2-PENTANONE	BDL	10	ug/L
STYRENE	BDL	5	ug/L
1,1,2,2-TETRACHLOROETHANE	BDL	5	ug/L
TETRACHLOROETHENE	BDL	5	ug/L
TOLUENE	BDL	5	ug/L
1,2-DICHLOROETHENE (CIS AND TRANS)	17	5	ug/L
TRANS-1,3-DICHLOROPROPENE	BDL	5	ug/L
1,1,1-TRICHLOROETHANE	BDL	5	ug/L
1,1,2-TRICHLOROETHANE	BDL	5	ug/L
TRICHLOROETHENE	BDL	5	ug/L
VINYL ACETATE	BDL	10	ug/L
VINYL CHLORIDE	14	10	ug/L
XYLENES (O/M/P-XYLENE)	BDL	5	ug/L

Parameter	Result	Det. Limit	Units
... SURROGATE RECOVERY -----			
DICHLOROETHANE-D4	95		% Rec
TOLUENE-D8	100		% Rec
4-BROMOFLUOROBENZENE	101		% Rec

## FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A

Analyst: E. MERRILL

Analysis Date: 02-DEC-93

Test: P130.4.0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	50		mL
FINAL VOLUME	50		mL

## ALUMINUM ICP SW846-6010A

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M101.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
ALUMINUM	BDL	0.050	mg/L

## ANTIMONY ICP SW846-6010A

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M102.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
ANTIMONY	BDL	0.030	mg/L

## BARIUM ICP SW846-6010A

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M104.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
BARIUM	0.15	0.010	mg/L

## BERYLLIUM ICP SW846-6010A

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M105.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
BERYLLIUM	BDL	0.0050	mg/L

## BORON ICP SW846-6010A

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M107.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
BORON	1.6	0.050	mg/L

## CALCIUM ICP SW846-6010A

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M109.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
CALCIUM	160	0.20	mg/L

## CHROMIUM ICP SW846-6010A

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: M110.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
CHROMIUM	BDL	0.010	mg/L

**COBALT ICP SW846-6010A**

Analyst: M. JAO Analysis Date: 06-DEC-93 08:00 Instrument: ICP  
 Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Test: N113.3.0

Parameter	Result	Det. Limit	Units
COBALT	BDL	0.010	mg/L

**COPPER ICP SW846-6010A**

Analyst: M. JAO Analysis Date: 06-DEC-93 08:00 Instrument: ICP  
 Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Test: N112.3.0

Parameter	Result	Det. Limit	Units
COPPER	BDL	0.020	mg/L

**IRON ICP SW846-6010A**

Analyst: M. JAO Analysis Date: 06-DEC-93 08:00 Instrument: ICP  
 Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Test: N115.3.0

Parameter	Result	Det. Limit	Units
IRON	2.8	0.025	mg/L

**MAGNESIUM ICP SW846-6010A**

Analyst: M. JAO Analysis Date: 06-DEC-93 08:00 Instrument: ICP  
 Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Test: N118.3.0

Parameter	Result	Det. Limit	Units
MAGNESIUM	84.	0.20	mg/L

**MANGANESE ICP SW846-6010A**

Analyst: M. JAO Analysis Date: 06-DEC-93 08:00 Instrument: ICP  
 Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Test: N119.3.0

Parameter	Result	Det. Limit	Units
MANGANESE	0.44	0.010	mg/L

**NICKEL ICP SW846-6010A**

Analyst: M. JAO Analysis Date: 06-DEC-93 08:00 Instrument: ICP  
 Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Test: N122.3.0

Parameter	Result	Det. Limit	Units
NICKEL	BDL	0.010	mg/L

**POTASSIUM ICP SW846-6010A**

Analyst: M. JAO Analysis Date: 06-DEC-93 08:00 Instrument: ICP  
 Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Test: N126.3.0

Parameter	Result	Det. Limit	Units
POTASSIUM	3.2	0.20	mg/L

**SILVER ICP SW846-6010A**

Analyst: M. JAO Analysis Date: 06-DEC-93 08:00 Instrument: ICP  
 Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Test: N130.3.0

Parameter	Result	Det. Limit	Units
SILVER	BDL	0.010	mg/L

**SODIUM ICP SW846-6010A**

Analyst: M. JAO Analysis Date: 06-DEC-93 08:00 Instrument: ICP  
 Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Test: N131.3.0

Parameter	Result	Det. Limit	Units
SODIUM	63.	0.20	mg/L

**VANADIUM ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: N138.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
VANADIUM	BDL	0.010	mg/L

**ZINC ICP SW846-6010A**

Analyst: M. JAO

Analysis Date: 06-DEC-93 08:00 Instrument: ICP

Test: N139.3.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
ZINC	BDL	0.020	mg/L

**GFAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-3020A**

Analyst: R. BYERS

Analysis Date: 07-DEC-93

Test: P130.6.0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	50		mL
FINAL VOLUME	50		mL

**ARSENIC GFAA SW846-7060**

Analyst: M. HEMMERLEIN

Analysis Date: 20-DEC-93

Instrument: GFAA

Test: N103.2.0

Prep: GFAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-3020A P130.6.0

Parameter	Result	Det. Limit	Units
ARSENIC	0.092	0.025	mg/L

1:5 dilution

**CADMIUM TRACE ICP SW846-6010A**

Analyst: J. WALLACE

Analysis Date: 21-DEC-93

Instrument: ICP

Test: N108.0.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
CADMIUM	BDL	0.0010	mg/L

**LEAD TRACE ICP SW846-6010A**

Analyst: J. WALLACE

Analysis Date: 21-DEC-93

Instrument: ICP

Test: N116.0.0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
LEAD	BDL	0.0050	mg/L

**THALLIUM GFAA SW846-7841**

Analyst: A. ROBERTSON

Analysis Date: 12-DEC-93

Instrument: GFAA

Test: N134.2.0

Prep: GFAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-3020A P130.6.0

Parameter	Result	Det. Limit	Units
THALLIUM	BDL	0.020	mg/L

1:4 DILUTION

**SELENIUM GFAA SW846-7740**

Analyst: A. ROBERTSON

Analysis Date: 20-DEC-93

Instrument: GFAA

Test: N128.2.0

Prep: GFAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-3020A P130.6.0

Parameter	Result	Det. Limit	Units
SELENIUM	BDL	0.0050	mg/L

**MERCURY CVAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-7470**

Analyst: G. MAPP

Analysis Date: 01-DEC-93

Test: P131.6.D

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	100		mL
FINAL VOLUME	100		mL

**MERCURY CVAA SW846-7470**

Analyst: G. MAPP

Analysis Date: 07-DEC-93

Instrument: CVAA

Test: M120.3.B.D

Prep: MERCURY CVAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-7470 P131.6.D

Parameter	Result	Det. Limit	Units
MERCURY	BDL	0.00050	mg/L

## Sample Comments

BDL Below Detection Limit

IDEM Drinking Water Certification Number C-49-01  
This Certificate shall not be reproduced, except in full,  
without the written approval of the lab.

